TWO READY-TO-RUN COMPRESSORS FOR

LOW-COST AIR POWER

IN YOUR SHOP

the PHE
- 75 and 100 hp packaged
- Opposed-piston balanced design

the XLE
- 125 to 250 hp packaged
- 300 and 350 hp with engine-type synchronous motor
- Thru-frame air flow

Why MODERN I-R DESIGN can reduce your air power costs and increase your production

Built tough for continuous full load, and refined for efficient performance at all loads.

Packaged, ready to run, each unit completely self-contained with crankshaft-mounted motor. Units up to 250 hp are shipped fully assembled, ready to hook up.

Full-floating aluminum bearings are foolproof, never need adjustment. They "roll with the punch" of every compressor stroke. Wear is distributed evenly around both inside and outside.

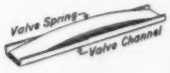
Closed crankcase never has to be opened for bearing adjustment, so dirt (the major cause of wear) is kept out of the oil.

Two-stage, intercooled compression, with I-R cylinders of proven design, makes most efficient use of horsepower.

Exceptionally smooth running balance permits small, simple foundation.

Compactness permits installation in small areas, requiring less of your valuable shop space.

CHANNEL VALVES give quiet, trouble-free operation and amazing long life due to air-cushioned action and reversible seat plates. Known all over the world for their efficiency, these valves are entirely different in design and principle from any other valve ever used. Channel valves are available only in I-R compressors.



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COMPRESSORS • CONDENSERS • AIR AND ELECTRIC TOOLS • TURBO-BLOWERS • PUMPS ROCK DRILLS • GAS AND DIESEL ENGINES

For more facts circle 502 on Reply Card

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'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

Plant Layout Course

AN INTENSIVE five-day technical program is being planned for the company facing expansion, consolidation or decentralization of its facilities, the planning of a new plant, or the relayout of an existing plant.

The course will be conducted at the University of Kansas from September 4 to 8. It will be an integrated study program supervised by top specialists in the field, and featuring a clinic-conference each evening on specific problems currently facing the plant of each enrollee.

Further information about this course may be obtained by writing to Midwest Work Course on Plant Layout and Facilities Planning, 4112 Eaton Street, Kansas City 3, Kansas.

Spray Finishing School

IT'S SCHOOL TIME again for those people interested in learning how to operate spray finishing equipment. Classes will be conducted at the DeVilbiss Co. School of Spray Finishing in Toledo and will run from Monday through Friday.

The five-day training periods will begin on the following dates: September 10, October 8, November 5 and December 10. Application blanks may be obtained by writing to the DeVilbiss Co., 300 Phillips Ave., Toledo 1, Ohio.

Expositions and Conferences

HERE IS A list of several expositions and conferences scheduled for September and October which you may wish to mark on your calendar.

The 1956 Iron and Steel Exposition will be held in the Cleveland Public Auditorium, Cleveland, Ohio, from September 25 to 28. A total of 14 technical sessions will be presented during the four days, discussing the latest information on progress and developments in the design, construction, operation and maintenance of iron and steel plants and plant equipment.

"Fifty Years of Progress Through Electronics" will be the theme of the 12th annual National Electronics Conference in Chicago from October 1 to 3. Approximately 100 technical papers and about 240 commercial exhibits will be featured at the three-day conference at the Hotel Sherman.

Problems concerned with hearing impairment will be among the subjects considered at the seventh annual Noise Abatement Symposium to be held in Chicago on October 11 and 12. Four papers dealing with several aspects of industrial hearing loss will be considered at the October 12 morning session. The talks will cover legal phases of the problem, hearing loss compensation laws, the use of audiometers and clinical experience with automatic audiometers. Three other half-day sessions devoted to machinery and transportation noises and the control of noise through architectural design will complete the two-day meeting. This two-day meeting will be held at the Hotel Sherman.

Behr-Manning Changes

MacKenzie

Henry C. Nelson, head of Behr-Manning's mechanical division for the last 34 years, recently retired.

He will be succeeded by **Malcolm S. MacKenzie,** who has been superintendent of the machine shop. At the same time, **Frank H. Gorke,** will be advanced to the office of superintendent.

Mr. Nelson has been a Behr-Manning employee since 1920, when his department numbered six men in contrast with 164 people it now employs. He is a member of the Mohawk-Hudson Chapter of the American Institute of Plant Engineers, and a former president of the Industrial Club of Troy.

Malcolm S. MacKenzie, also a member of the Mohawk-Hudson Chapter of the AIPE, is president of the Chapter for the 1955-1956 term.

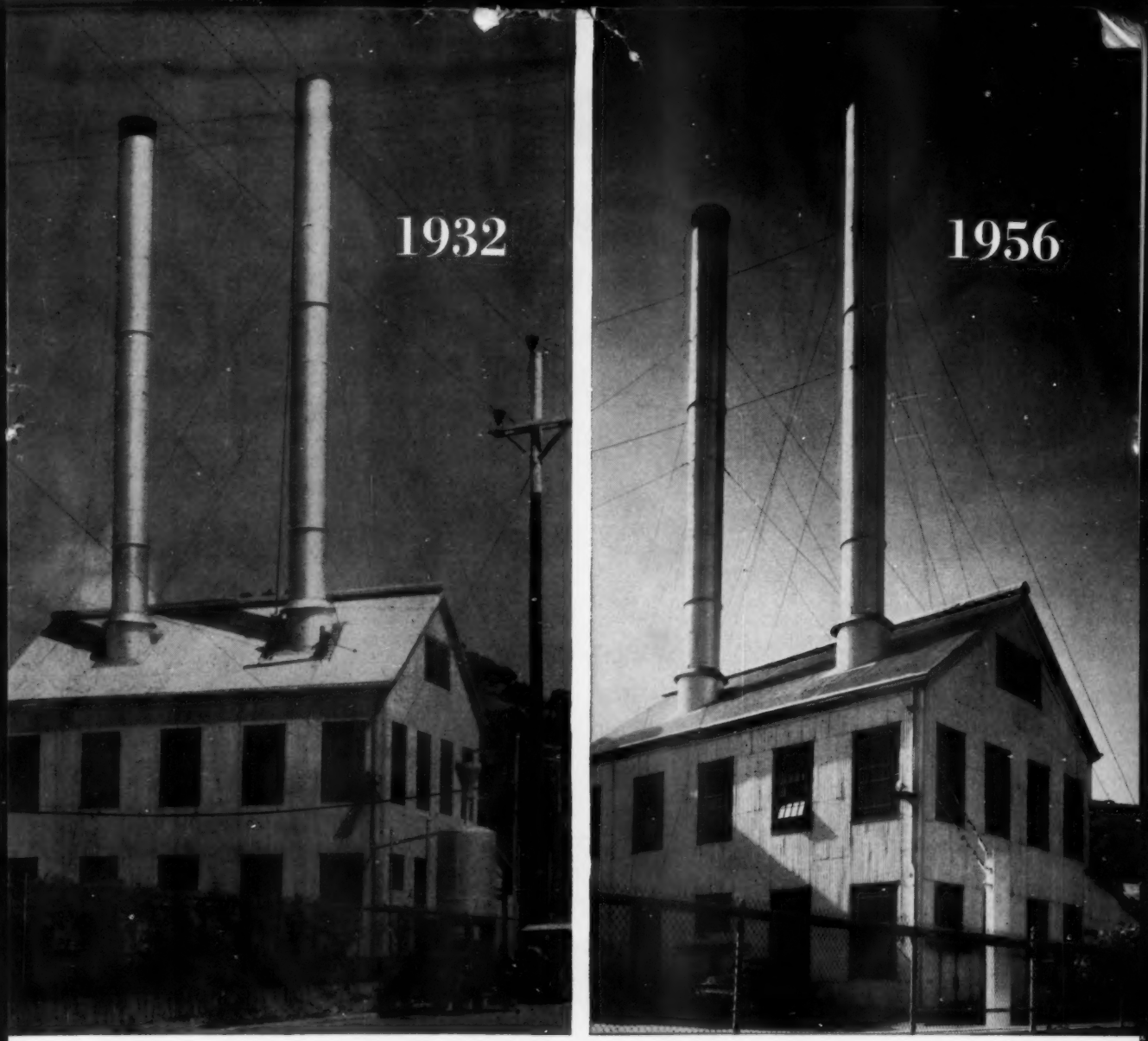
Storage Battery Analyzer

FEATURING SIMPLE and accurate control, a new storage battery analyzer, with a wide scope of variables measured, and a complete, continuous record, has been developed by the Naval Research Laboratory.

The analyzer was developed in an attempt to meet the need for a more complete analysis of fully assembled cells under operating conditions. The instrumentation is simple to understand and use, and can, for the most part, be built from commercially available parts at a reasonable cost.

Instrumentation and techniques of this analyzer are described in report PB 111932, Battery Analyzer for Use in

Subscriptions: U.S.A. $10, Canada $11. Other countries $12 per year. Single copies $1. Change of Address: Send to PLANT ENGINEERING, Circulation Division, Barrington, Illinois. Please supply position title, company name, company address. Request must reach us by 15th of month to make the change effective with following month's issue. Published monthly and accepted as controlled circulation publication at Chicago, Ill.



Installed 24 years ago.....still in excellent condition
Here's another Wrought Iron Plate durability story

After twenty-four years of service over boilers, these wrought iron stacks still rate a "no maintenance needed" inspection report.

These stacks, installed at San Rafael, California, Gas Plant of Pacific Gas & Electric Company, tell the kind of story repeated over and over again whenever wrought iron is used. It's a story of economy made possible because of wrought iron's unique defense against flue gas corrosion.

Byers wrought iron plate is an old campaigner in stack service. You'll find documented evidence of its endurance in our bulletin, *Wrought Iron for Flue Gas Conductors and Coal Handling Equipment.* Clear up a lot of questions about stack maintenance. Write us today for this helpful aid . . . it will pay you.

A. M. Byers Company, Pittsburgh, Pa. Established 1864. Division Offices in Boston, New York, Philadelphia, Washington, Atlanta, Chicago, St. Louis, Houston, San Francisco. International Division: New York, N.Y.

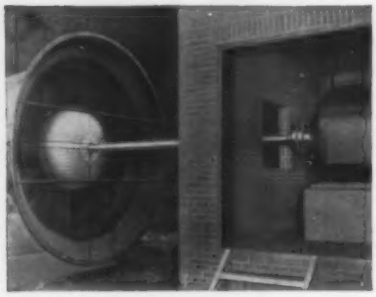
Available in Canada and throughout the world

BYERS *Wrought Iron Tubular and Hot Rolled Products*

ALSO ELECTRIC FURNACE QUALITY STEEL PRODUCTS

For more facts circle 503 on Reply Card

Eliminate Intermediate Bearings!



By using Thomas Flexible Couplings on long, unsupported shafts, intermediate bearings are eliminated. Thomas engineers tubular shafts free from lateral whip.

The large fan shown above is 16′ from the motor to allow sufficient air intake. Miners working underground receive their fresh air supply from this fan and others like it, which have been giving dependable service for as long as fifteen years . . . without shutdowns for lubrication or maintenance of the couplings.

Thomas floating shaft flexible couplings are recommended for machine and marine drives, printing presses, paper and cement mills, cooling towers, diesel engines, pumps, compressors, and many other uses.

Only Thomas Flexible Couplings offer *all* these advantages

UNDER LOAD and MISALIGNMENT

1. Freedom from Backlash—Torsional Rigidity
2. Free End Float
3. Smooth Continuous Drive with Constant Rotational Velocity
4. Visual Inspection in Operation
5. Original Balance for Life . . . *and*

Thomas All Metal Couplings have No Wearing Parts so Lubrication and Maintenance are Eliminated

Write for Engineering Catalog 51A

THOMAS FLEXIBLE COUPLING CO.

WARREN, PENNSYLVANIA, U.S.A.

For more facts circle 504 on Reply Card

'ROUND ABOUT

Storage Battery Studies, by G. W. Work and C. P. Wales, Naval Research Laboratory, Feb. 1956. This 20-page report may be obtained by writing to the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C., price 50 cents.

Air Pollution Studies

STUDIES ON THE causes of air pollution have been conducted by the University of California and the results of these studies have been compiled in the report "First Report of Air Pollution Studies." This booklet is identified as Report 55-27.

The report discusses the following subjects: Microwave Methods of Studying Air Pollution; Exhaust Control Devices; Investigation of Systems for Removing Irritants from Polluted Air; Incineration Studies, etc.

Readers interested in having a copy of this report should direct their inquiry to Robert C. Carey, University of California, Department of Engineering, Los Angeles 24, California.

Plant Engineers Promoted

Albert N. Guthrie, plant engineer at the Ottawa, Illinois, plant of Libbey-Owens-Ford Glass Co., has been promoted to plant production manager. This position was formerly held by Peter J. Kirkman who will take on the new duties of assistant plant manager.

Mr. Guthrie, a native of Ottawa, and a graduate of Purdue University with a degree in Electrical Engineering, joined the company in 1935 and served as assistant chief power plant engineer and superintendent of services before becoming plant engineer.

Lucien C. Strow will take over the plant engineering duties at the Ottawa plant. He studied engineering at the University of Kentucky and came to Ottawa with the Stone & Webster Engineering Co., in 1945, while they were engaged on an LOF plant expansion project. On completion, he joined the LOF engineering department.

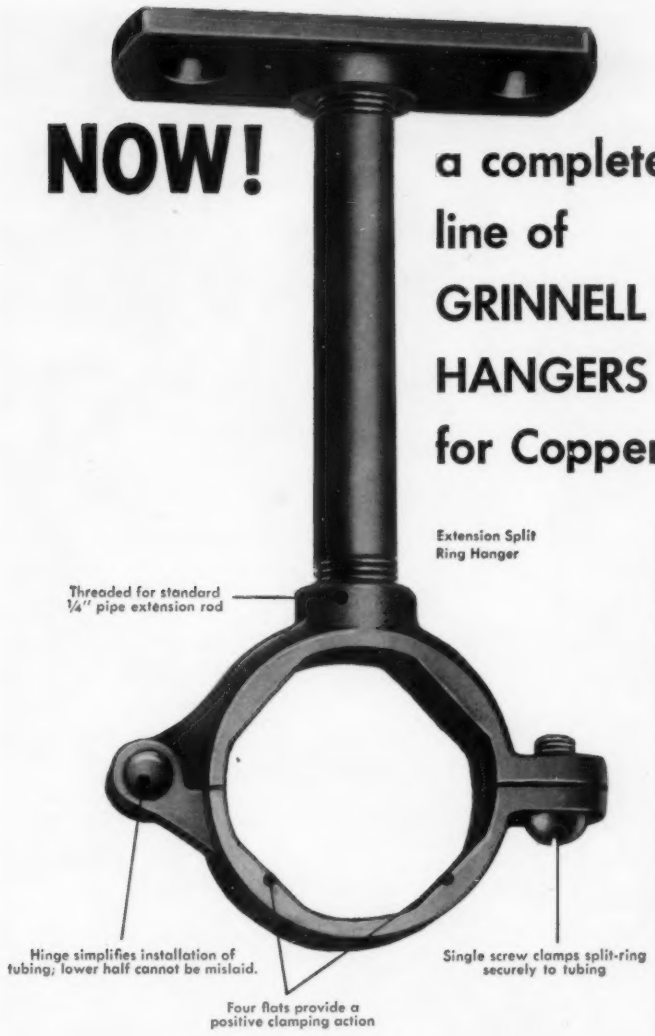
Safety Plaque Presented To Plant Engineering

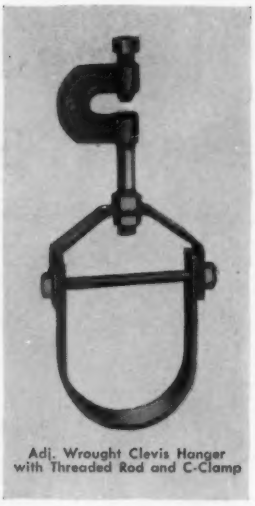
Yours truly was happy to accept the 1955 Public Interest Award plaque presented to Plant Engineering from George MacDonald, left, senior consulting engineer, National Safety Council

SBME Presents "Voice of Business" Award to Henry Ford II

Henry Ford II, president, Ford Motor Co., is shown receiving the Society of Business Magazine Editors first annual "Voice of Business" award. Left to right are: Frank Tighe, editor, Motor Age; Paul Wooton, Washington, D. C., newspaperman and chairman of the Society's executive committee; Mr. Ford; Eldridge Peterson, editor, Printers' Ink. The award was given to Mr. Ford in recognition of his "making the most substantial contribution to industry in 1955 in leadership, in business ethics, and in making it understood that businesses, in general, are conducted with careful regard for the public interest"

NOW! a complete line of GRINNELL HANGERS for Copper Tubing


Extension Split Ring Hanger
Threaded for standard ¼" pipe extension rod
Hinge simplifies installation of tubing; lower half cannot be mislaid.
Four flats provide a positive clamping action
Single screw clamps split-ring securely to tubing


Adj. Wrought Clevis Hanger with Threaded Rod and C-Clamp

Adj. Wrought Ring Hanger

Split-Ring with Socket and Coach Screw

Adj. Wrought Band Hanger

Grinnell now offers, in one *complete* line, every standard type of hanger and support for copper tubing. All are heavily copper plated for long, rugged wear. All are accurately sized to fit standard copper tubing, and designed to give a neater installation wherever copper tubing is used.

For dependability, speed, and convenience . . . let Grinnell's coast-to-coast network of warehouses and jobbers serve you as a one-stop source for all your copper tubing hanger requirements. Grinnell-trained personnel are ready to work with you "on-the-job", anywhere, to help solve any problem connected with hangers and supports for copper tubing.

Whether it be for copper tubing or standard pipe, specify Grinnell hangers. No other company makes as complete a line; provides as thorough a distribution service; or can cooperate as fully on *all* your piping assignments.

Write for your copy of the COPPER TUBING HANGER Catalog. Grinnell Company, Inc., 222 West Exchange St., Providence, Rhode Island.

GRINNELL

AMERICA'S #1 SUPPLIER OF PIPE HANGERS AND SUPPORTS

Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves
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For more facts circle 505 on Reply Card

"My boss was stunned when I said . . .

'This plant looks modern... but electrically it's obsolete!' "

"About two years ago the plant manager and I were touring the shop areas. We were half way through when I turned and said, 'This plant looks modern . . . but electrically it's obsolete!'

"As plant electrical services engineer, I got his permission to make a study of our plant power distribution system.

"Even I got a big surprise. We found that the power supply wasn't as safe, dependable or flexible as we required . . . and maintenance costs were getting out of hand. A lot of our electric equipment was antiquated and took up valuable production space.

"We had spent so much time improving manufacturing processes and methods that we had neglected electrical needs. Electrically, we were obsolete . . . and not prepared for the big swing to automation.

"Our plant power distribution system has been modernized since then. We've installed more automatic equipment and work-handling devices, and we are ready to apply more advanced types of automation. Our new branch plant is being provided with electrical adequacy, too.

"You can probably do the same thing we did to get greater efficiency."

J-96101-1

Is your plant suffering from electrical growing pains?

Surveys show that many of the nation's plants are inadequate electrically. A recent study of 42 plants in a given area revealed 88% had electrical problems that interfered with production.

These Problems Can't Wait

	Percent of Plants Inadequate — Electrically*
Inadequate transformer capacity and flexibility	42%
Questionable breaker interrupting capacity	63%
Lack of power centers	62%
Poor power factor	25%
No motor control centers	42%
No plug-in bus duct	32%
Low primary distribution voltage (below 4160 volts)	49%
Low secondary voltage (below 480 volts)	25%
Lack of network distribution systems	90%
Lack of automatic switching to maintain continuity	69%
Absence of 277-volt lighting	94%

*Based on report of survey in 156 top U.S. plants conducted by *Factory* magazine.

WATCH WESTINGHOUSE!

COVER THE PRESIDENTIAL CAMPAIGN ON CBS TV AND RADIO!

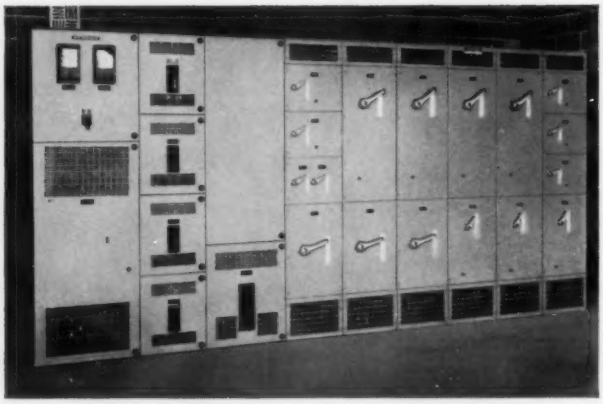
"I called in Westinghouse . . .

Electrical obsolescence disappeared"

Westinghouse switchgear is available in 10 basic units with a selection of standard instrument panels . . . future additions or replacements can be made easily and quickly any time.

"In the process of updating our plant power distribution system, we called upon Westinghouse for expert help. They worked with our staff and consulting engineers to give our plant electrical adequacy.

Westinghouse dry-type transformers save space, mount conveniently in out-of-the-way places. Well suited for wet, dirty or hot locations. Placement close to work load saves long, costly secondary runs.



Expansion with Westinghouse control centers frequently saves as much as 40% on installation costs over decentralized methods of mounting motor control. Inspection and service are simplified.

Switchgear gave us safer, more dependable operation

"We selected Westinghouse low-voltage, metal-enclosed switchgear which gave us high interrupting capacity, assuring safety and operating continuity. It reduced our maintenance, brought economic advantages and freedom to expand our facilities.

"In our new installation, unitized Westinghouse switchgear reduced our special design and engineering expense, and provided custom-built preciseness for our application requirements.

Capacitors paid for themselves in 18 months

"With Westinghouse guidance, we applied capacitors carefully at the substation bus, on secondary bus duct, and right at the motor loads. Savings on our power bill in the first year amounted to 75% of capacitor installed cost. Capacitors paid for themselves in 18 months, and the savings are still going on.

"The capacitors reduced the burden on our feeders and released electrical capacity for other needs. We got better voltage regulation at our motor and lighting loads.

Transformer provided convenient power . . . economically

"We wanted to get power close to the load . . . placing Westinghouse transformers strategically throughout our plant did the job conveniently, economically. For high-impulse levels we used oil- and askarel-filled units, while dry types were used when light weight and ease of installation were vital. I learned that a combination of Hipersil® cores and high-temperature insulation in Westinghouse transformers reduces size and weight one third.

Westinghouse capacitors are low in initial cost, require no maintenance, save additional investment in transformer capacity. Solder-sealed porcelain bushings protect against leaks or contamination of dielectric.

Packaged control simplified system design

"Westinghouse furnished control centers for our permanent machine arrangements. This gave us simplicity in planning and installation, a high degree of safety and flexibility, centralized operation and maintenance.

"Some of our machines were subject to frequent moving. Here we used Westinghouse plug-in bus duct with individual controls at each machine. In both cases, we found that Westinghouse packaged control equipment simplified system design, reduced some costs up to 40%.

"Why not call Westinghouse . . . like I did?"

"I'm sure you'll find Westinghouse a real lifesaver in helping out with your plant power distribution systems, too. Their engineering team will gladly work with your staff and your consulting engineers. I got our plant on the road to electrical adequacy by getting in touch with my local Westinghouse representative."

For more information, call your local Westinghouse sales office or send coupon. Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-96101-2

WATCH WESTINGHOUSE!

COVER THE PRESIDENTIAL CAMPAIGN ON CBS TV AND RADIO!

Westinghouse Electric Corporation
3 Gateway Center, P. O. Box 868
Pittsburgh 30, Pa.

☐ I would like a showing of the 20-minute film, *Selecting the Right Industrial Distribution System.*

I'm interested in more information about:

☐ Switchgear ☐ Capacitors

☐ Transformers ☐ Controls

NAME_____ TITLE_____

FIRM_____

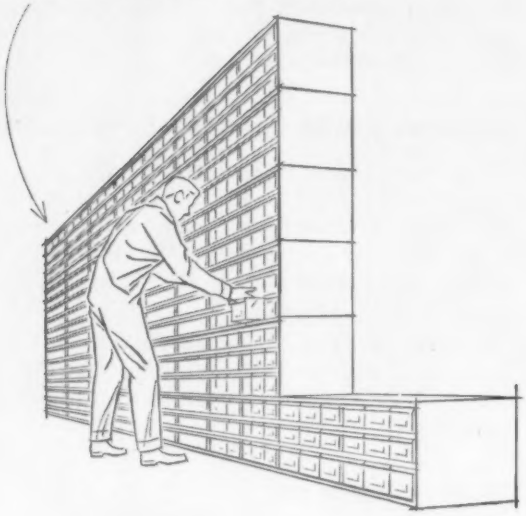
ADDRESS_____

CITY_____ STATE_____

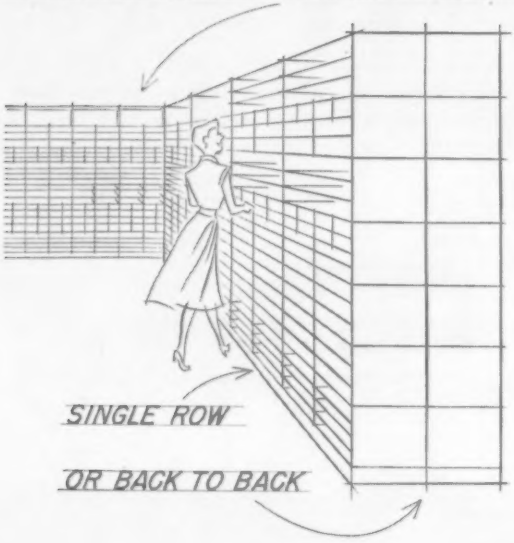
For more facts circle 506 on Reply Card

HOW TO USE HALLOWELL STORAGE WALLS IN MAKING ECONOMICAL STORAGE SPACE

STACK THEM AGAINST WALLS
-AS HIGH AS YOU WANT
-AS LONG AS YOU WANT



USE THEM TO BUILD PARTITIONS OR WALLS



SINGLE ROW

OR BACK TO BACK

SET THEM UP ADJACENT TO MACHINES AND OTHER WORK AREAS TO STORE BOOKS, TOOLS, PARTS, ETC.

Prime Cold Rolled Steel · All Welded and Finished with Baked on Enamel · Interchangeable Drawers · 3 Different Size Drawers Can Be Intermingled in the Same Case · Stocked by Leading Shop Equipment Dealers · Send for Bulletin 2093 · Hallowell Shop Equipment Division, Standard Pressed Steel Co., Jenkintown 26, Pa.

HALLOWELL SHOP EQUIPMENT DIVISION
STANDARD PRESSED STEEL CO.
SPS
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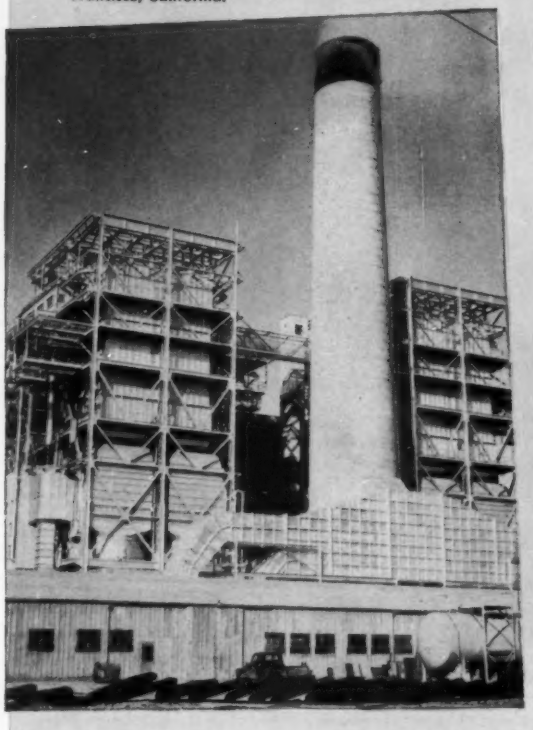
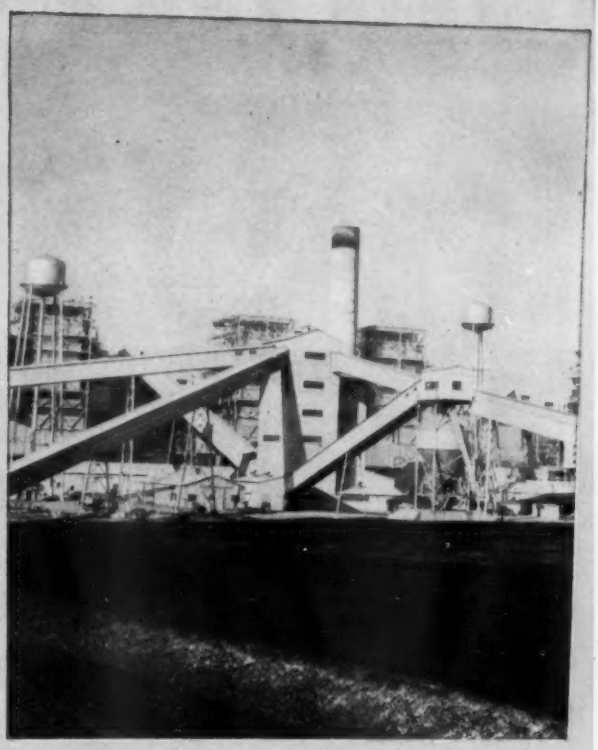
BENCHES (CABINET, WORK, UNIT) • STOOLS AND CHAIRS • SHOP DESKS • TOOL STANDS AND CABINETS • DRAWERS, DRAWER TIERS • STEEL CARTS • SHELVING

For more facts circle 507 on Reply Card

Close-up photo shows the brilliant protective coat of aluminum paint, applied by Hartman-Walsh Painting Company, St. Louis, Missouri. This plant, with one of the largest generating capacities in the world, was recently completed by the Bechtel Corporation, San Francisco, California.





Joppa Steam Electric Station, Joppa, Illinois, is completely protected with gleaming Phelan's Safe-T-Spray Aluminum Paint, manufactured by **Phelan-Faust Paint Manufacturing Company, St. Louis, Missouri.**

Joppa Steam Electric Station painted with Phelan's Safe-T-Spray Aluminum Paint while in full operation

Quick-drying paint saves time, money

The huge Joppa Steam Electric Station, operated by ELECTRIC ENERGY, INC., was completely painted with Phelan's Safe-T-Spray Aluminum Paint by HARTMAN-WALSH PAINTING CO., St. Louis, Mo.

Pigmented with ALCOA® Aluminum, the new spray coating dries exceptionally fast, allowing primers to be recoated within one hour. This eliminates the need for costly, time-consuming rerigging or re-scaffolding ordinarily required for second coats. And because Phelan's Safe-T-Spray dries fast, unusual film build-up can be accomplished, often in one application. A thicker paint coating means greater protection for less money.

In addition, mist or spray dust from Phelan's Safe-T-Spray dries while in the air, will not adhere to autos, machinery or adjacent painted surfaces, can be wiped from objects at a distance of 30 to 40 feet from the spray gun. Because of dry-mist, fences, towers, roofs, smokestacks or entire plants, like the Joppa Electric Station, can be completely painted without interrupting traffic or plant operation.

ALCOA does not make paint, but ALCOA Aluminum Pigments are used in more aluminum paints than any other brand. Special formulas, like Phelan's Safe-T-Spray, have been developed to solve individual problems. Write today for our two FREE booklets, *Painting With Aluminum* and *Aluminum Asphalt Roof Coatings Make Time Stand Still.* They contain valuable information on all types of aluminum paints and roof coatings.

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TELEVISION'S FINEST LIVE DRAMA
ALTERNATE SUNDAY EVENINGS

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Name_____
Company_____
Address_____
City_____ Zone____ State_____

For more facts circle 508 on Reply Card

COMPLETE *Finishing* SYSTEMS

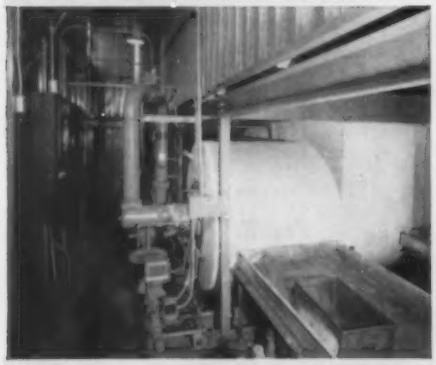
. . . for ENAMELS • LACQUER • PAINT • VARNISH

STRAIGHT-LINE PRODUCTION ON THE ROOF

. . . the EXPERIENCE that goes into the PLANNING and ENGINEERING of MAHON EQUIPMENT is the item of GREATEST VALUE to YOU!

Above is the 700-Foot Long Self-Housed Finishing System Planned, Engineered and Built by Mahon on the Roof of the Whirlpool-Seeger Corporation's Marion Division Plant, Marion, Ohio. Much of the housing in this installation is an integral part of the Finishing Equipment.

Mahon Seven-Stage Metal Cleaning and Rust Proofing Machine installed in the Self-Housed Mahon Finishing System illustrated above. Ample space is provided for attendant on operating side.



Mahon Oven Control Cabinet, which houses Temperature Recorder, Air Flow Switches and other Safety Control Devices, is shown at left. Mahon Oven Heating Unit appears in foreground.

Pinched for Space Inside? . . . there's LOTS of SPACE ON THE ROOF!

Here's a typical example of straight-line finishing production unfettered by restrictions normally encountered inside manufacturing plants. This Finishing System was planned, engineered and built by Mahon on the roof of the Whirlpool-Seegar Corporation's Marion Division Plant, Marion, Ohio . . . it was built on the roof because suitable space inside the plant was not available. In the 700-foot long enclosure, which is permanent construction, are housed a Seven-Stage Metal Cleaning and Rust Proofing Machine, a Dry-Off Oven, a Cooling Tunnel, a Flow-Coater and Vapor Conditioning Chamber, Reinforcing Booth and Filtered Air Supply System. The Finish Baking Oven, which was already in place, was rebuilt by Mahon with three new Heating Systems. This is a Mahon solution of a problem confronting one manufacturer. If you have a finishing problem, or are contemplating new finishing equipment—for either Electrostatic Coating, Spray Painting, Flow-Coating or Dip-Coating—you, too, will find that Mahon engineers are better qualified to advise you on both methods and equipment requirements. No matter what your finishing job may be, you'll find that Mahon equipment will serve you better . . . because, Mahon equipment is engineered better and built better for more economical operation over a longer period of time. You can rely on Mahon to do the complete job on one contract—undivided responsibility for the entire system insures proper coordination, and safeguards you against complications which may upset your production schedules. See Mahon's Insert in Sweet's Plant Engineering File, for information, or write for Catalog A-656.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

SALES-ENGINEERING OFFICES in DETROIT, NEW YORK and CHICAGO

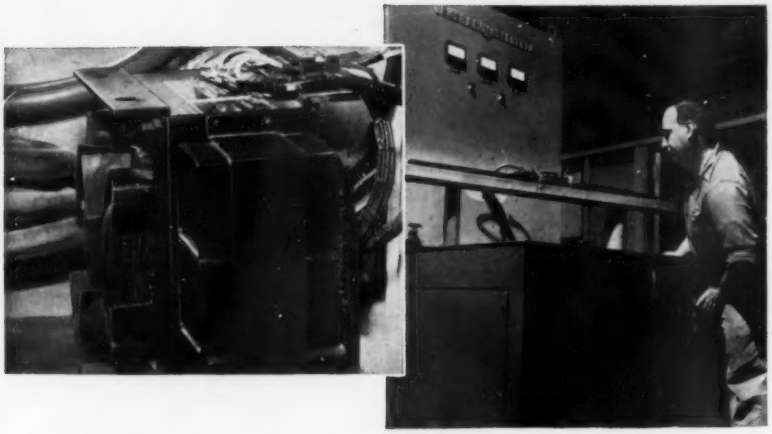
Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning, Pickling and Rust Proofing Equipment, Hydro-Filter Spray Booths, Dip and Flow Coaters, Filtered Air Supply Systems, Drying and Baking Ovens, Cooling Tunnels, Heat Treating and Quenching Equipment for Aluminum and Magnesium, and other Units of Special Production Equipment.

MAHON

For more facts circle 509 on Reply Card

Dry-Type Transformer NEWS

G-E voltage stabilizing transformers featured in new line of electronic induction heaters



G-E voltage stabilizing transformers in new induction heaters assure continuous production.

VOLTAGE CONTROL WITHIN ±3% PERMITS SAVINGS IN MAINTENANCE COSTS

In the design of the Company's new line of electronic induction heaters, G-E engineers considered one fact of primary importance. Fluctuating voltage of just 5% can decrease tube life in electronic induction heaters by as much as 50%. This fact prompted engineers to equip the new induction heater line with field-proven G-E voltage stabilizing transformers. G-E voltage stabilizing transformers hold tube filament voltage to ±3%. Extra-long tube life results to hold down induction heater maintenance costs, and assure continuous heat-treating in metal-working plants.

G.E. Markets New Indoor-Outdoor Dry-type Transformer

G.E.'s Specialty Transformer Department announces the availability of a new extra-quiet, indoor-outdoor 25-kva transformer. Equipped with mounting ears for convenient wall or column mounting, the transformer is specially designed for applications where moisture, dust, lint, are primary factors. Some design features: a phosphatized finish with final coat of G-E Glyptal* alkyd-resin helps prevent rust and corrosion; gaskets between cap and core and between terminal compartments and core are of special weatherproof material; heat is radiated through exposed core, thus eliminating draft through the coils (especially important where corrosive atmospheres are prevalent).

One other point: the new transformer has an unusually low noise level due to vibration-resistant construction. The transformer's low noise level makes it particularly suitable for applications in apartments, offices, hospitals, and in other situations where noise is an important factor. Section 410-22, General Electric Co., Schenectady 5, N. Y.

*Registered trade-mark of the General Electric Company

BUCK-BOOST TRANSFORMERS PERMIT AIR-CONDITIONING OEMS TO STANDARDIZE ON 230-VOLT COMPONENTS

Plenty of interest has been generated in the air-conditioning market by news from G.E. that users and manufacturers can standardize on 230-volt units and still operate from 208-volt distribution systems. Voltage can be boosted from 208 volts to 230 volts with General Electric buck-boost transformers available in ratings to handle any size air-conditioning unit.

Immediate advantage to the user: he can purchase standard 230-volt air conditioners at lower cost than special 208-volt units and match them to his distribution voltage.

Immediate advantage to the manufacturer: he can eliminate dual inventories of 208-volt and 230-volt components.

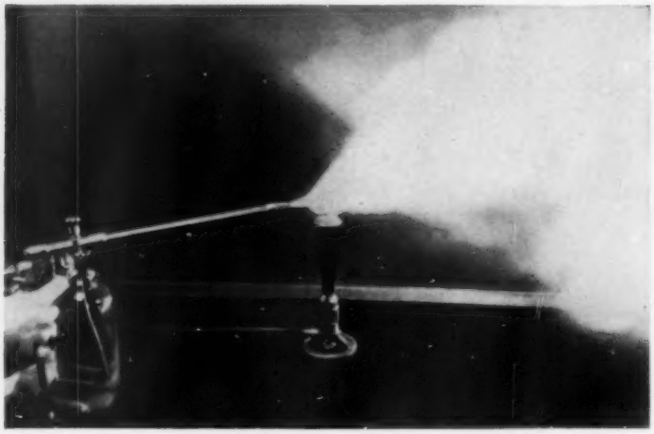
GENERAL ELECTRIC

For more facts circle 510 on Reply Card

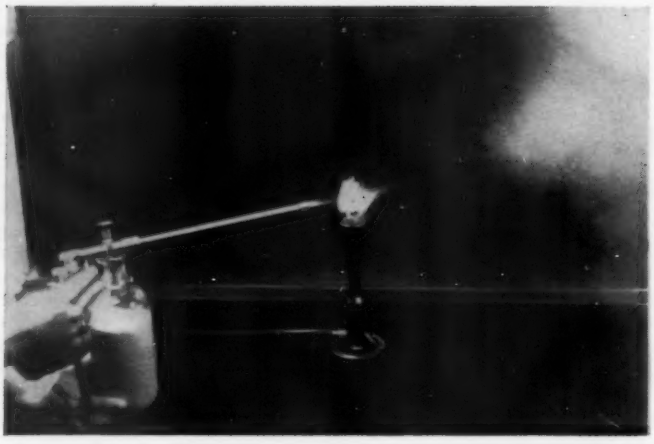
Announcing...the First

HYDRAULIC

Flame tests prove its fire-snuffing ability



This photo shows the instant combustion taking place when a conventional hydraulic oil of mineral oil type is atomized over a Bunsen burner.



In this photo, Shell Irus Fluid 902 replaces the mineral oil. Note that there is no ignition.

SHELL IRUS FLUID 902

Oil-Base fire-resistant FLUID

SHELL IRUS FLUID 902

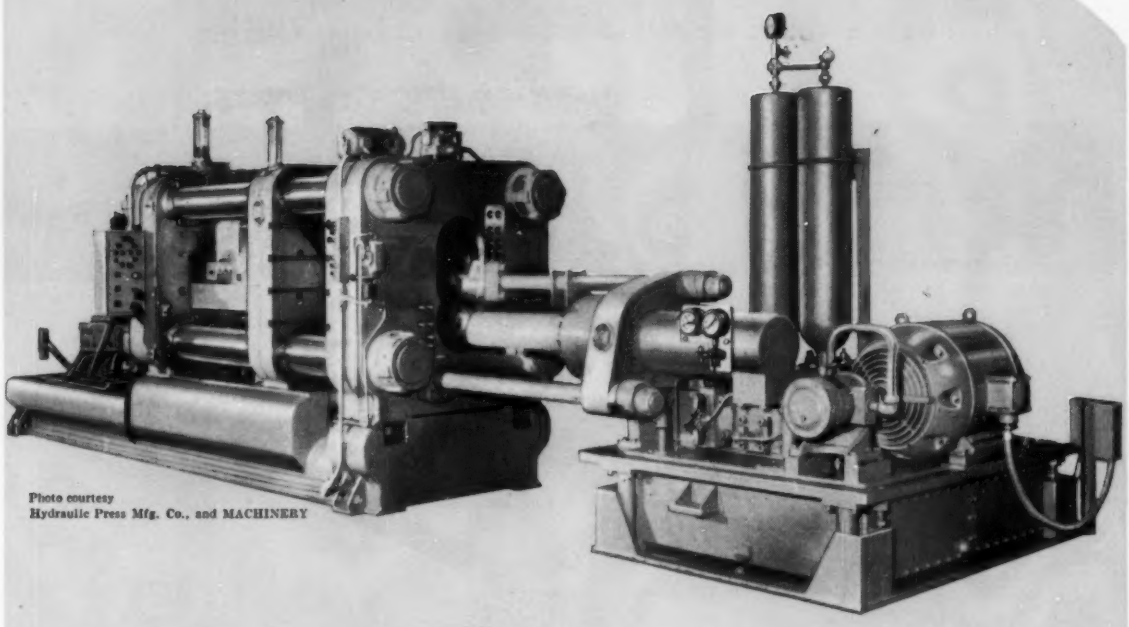


Photo courtesy
Hydraulic Press Mfg. Co., and MACHINERY

AFTER THREE YEARS of intensive research, field application and evaluation, Shell Irus Fluid 902 is now commercially available for use in industrial hydraulic systems. While its cost is far lower than other fire-resistant fluids, its performance is comparable.

No major modification of equipment is necessary. Shell Irus Fluid 902 is a special formulation containing no corrosive ingredients . . . no adverse effect on seals or fittings. It is a direct replacement for hydraulic oils now in service.

Noncorrosive, and nonrusting. Steel and copper panels immersed in Irus Fluid 902 for one week at 160°F have shown no significant signs of corrosion. Rusting has not been a problem in long-continued field tests.

This is an efficient fire-snuffing hydraulic fluid that can be widely used. Send coupon for details.

SHELL OIL COMPANY

50 WEST 50 STREET, NEW YORK 20, NEW YORK

100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA

SHELL

SHELL OIL COMPANY
50 West 50th St. or 100 Bush St.
New York 20, N. Y. San Francisco 6, Cal.

Please send me test data and information on Shell Irus Fluid 902.

Name_____

Company_____

Address_____

_____

For more facts circle 511 on Reply Card

BETTER ELEVATORING IS

No installation is too **large**

FREIGHT ELEVATORS for loads ranging from 40,000 pounds down to 2,500 pounds.
Booklet B-705 describes Otis Heavy Duty Freight Elevators.
Booklet A-414 describes Otis Plunger Electric Freight Elevators.
Booklet A-382 describes all Otis Vertical Transportation equipment and services.

FREIGHT ELEVATORS for loads ranging from 2,500 down to 1,500 pounds.
Booklet B-720 describes Otis Self-Supporting Light Duty Freight Elevators.

We'll be glad to send you any or all of the above booklets.

ELECTRIC • PLUNGER ELECTRIC
freight elevators
LIGHT, GENERAL, AND HEAVY DUTY
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OTIS ELEVATOR COMPANY • 260 ELEVENTH AVENUE • NEW YORK 1, N. Y.

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installation
is too
small

THE BUSINESS OF OTIS

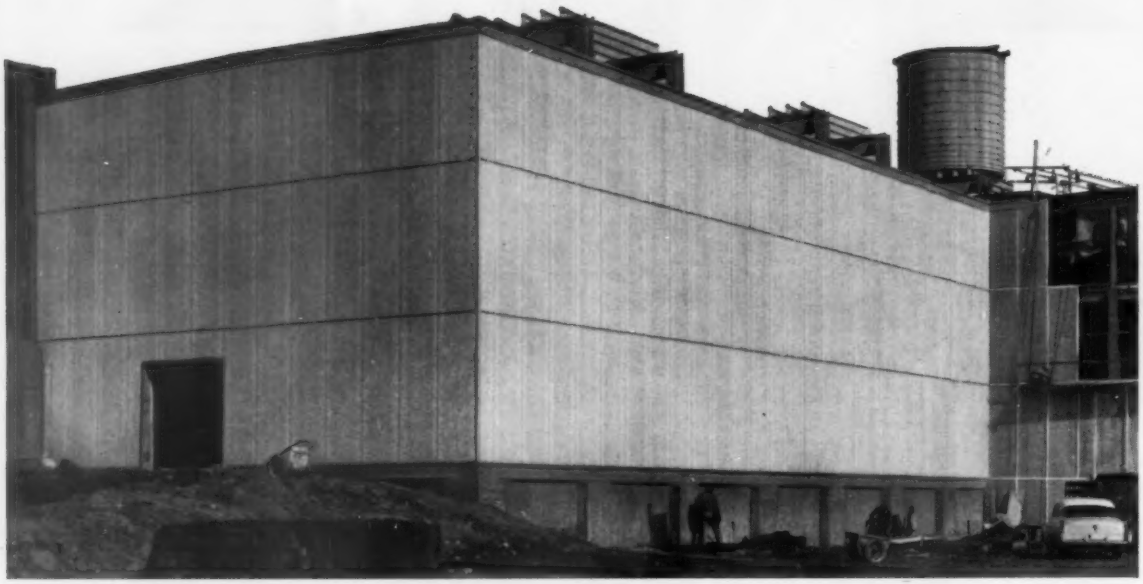
OFFICES IN 297 CITIES ACROSS THE UNITED STATES AND CANADA

For more facts circle 512 on Reply Card

Johns-Manville **TRANSITOP**® Structural Panels

MEET THE TREND TO

MODERN PANELIZED CONSTRUCTION



Transitop Panels offer maximum coverage... minimum erection cost

THE MOST striking change in building construction methods in recent years has been the trend toward prefabricated building panels.

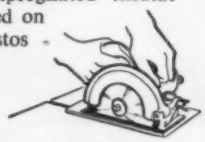
This is particularly true in the construction of panelized curtain walls for buildings, large and small. Although curtain wall construction in skyscrapers has been widely publicized, this method of construction is just as applicable to smaller buildings such as schools, hospitals, office buildings, motels and shopping centers. Today, paneled curtain walls probably exceed all other applications in popularity and are rapidly becoming the standard method of building construction.

Johns-Manville Transitop offers architects, designers and builders a simple and economical method of providing panelized curtain walls. Transitop is durable, weather resistant, requires minimum maintenance. As a curtain wall, Transitop provides high structural strength, reduces the dead load, increases usable floor space, provides adequate insulation and is easy to erect. Panels are easily applied over wood or steel framing.

The same advantages that make Transitop so suitable for panelized curtain wall construction also make it equally ideal for roof deck construction.

J-M Transitop is a complete 4′ wide by 8′, 9′, 10′, or 12′ long unit, in 1⅛″, 1⅛″, 1⅝″, or 2″ thicknesses. It consists of an integral impregnated insulating board core faced on two sides with Asbestos Flexboard® sheets.

- Facings of tough, weatherproof asbestos-cement Flexboard
- Core of integrally impregnated insulating board
- Waterproof adhesive bonds core to Flexboard sheets



Transitop is cut to fit and installed with ordinary construction tools

For information on Transitop, write Johns-Manville, Dept. PE, Box 158, New York 16, N. Y.

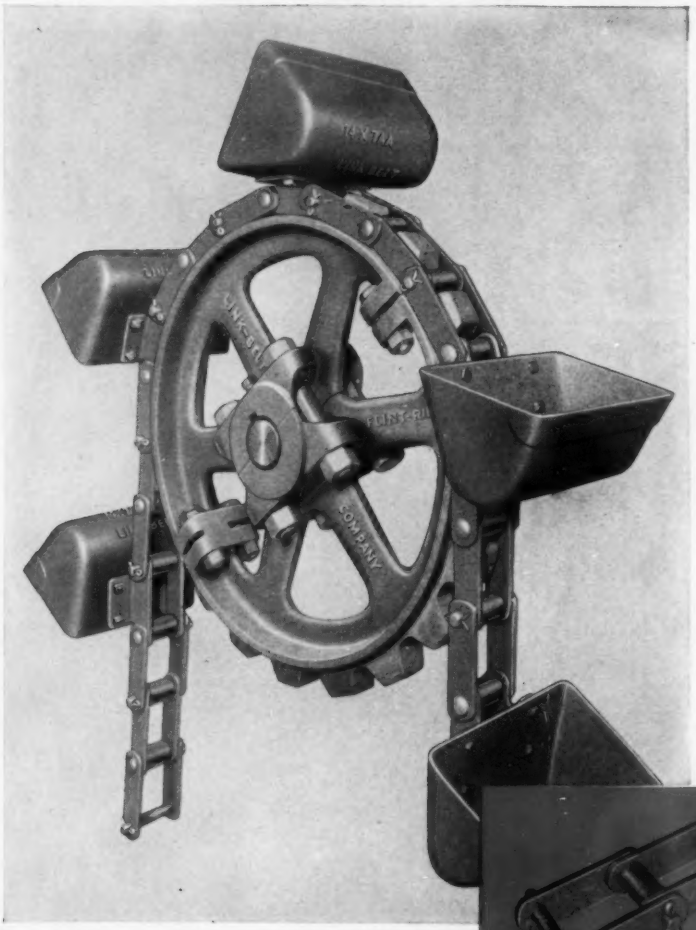
JOHNS-MANVILLE PRODUCTS

Johns-Manville

For more facts circle 513 on Reply Card

4 times the life... 1/4 the maintenance

through proper selection of LINK-BELT *chain*



Bucket elevator at fertilizer plant proves advantage of choosing from this complete line

Often there's no need to go to excessively costly cast special alloy chains to get long life. Here's proof: In an Indianapolis fertilizer plant, Link-Belt SS-111 bushed chain (left) handled an average of 75,000 to 80,000 tons of fertilizer before requiring replacement. The previous type of chain had to be replaced after handling 18,000 tons.

This installation is an example of the efficiency and economy that can be gained by applying the one chain best suited to specific conditions from the complete Link-Belt line. Remember, no other single source offers you such a broad range of roller, silent, cast, combination, forged and fabricated chains . . . with matching sprockets.

A call to your nearby Link-Belt office or authorized stock-carrying distributor will bring you all the facts about the complete line of Link-Belt chains and sprockets.

Under severely corrosive conditions, Link-Belt SS chain on bucket elevator of this type in fertilizer plant handled 80,000 tons, to previous chain's 18,000.

Looking for the *best* chain for a specific need? Link-Belt makes the *complete* line.

LXS steel chain

800 Ley bushed chain

Class C combination chain

"Flint-Rim" cast sprockets

LINK-BELT

CHAINS AND SPROCKETS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 13,910

For more facts circle 514 on Reply Card

For more facts circle 515 on Reply Card ——→

Why selecting the right

cable can be a big problem

You have a plant to wire. You know all the wiring requirements that have to be met. You have catalogs showing an endless variety of power and control cables to choose from. Sure you can pick a *good* one. But how do you unerringly select the *best* for your job? Mostly, it's experience that turns up the *best* from a selection of *good* possibilities. Your own experience is important, of course. And . . . in making the best selection, it's important to remember . . .

How General Electric Can Help You

General Electric has helped many engineers in leading electric utilities and industrial plants solve their wire and cable problems. This experience is at your disposal.

What's more General Electric wire and cable engineers have solved innumerable problems of the same kind which have developed in General Electric's own facilities. And, of course, General Electric knows the requirements of the connected equipment—transformers, load centers, motors, controls, etc. That's experience, too.

And, since the G-E line of cables covers almost every possible type and construction, these engineers can pick the one cable that will do a given job most efficiently, most economically.

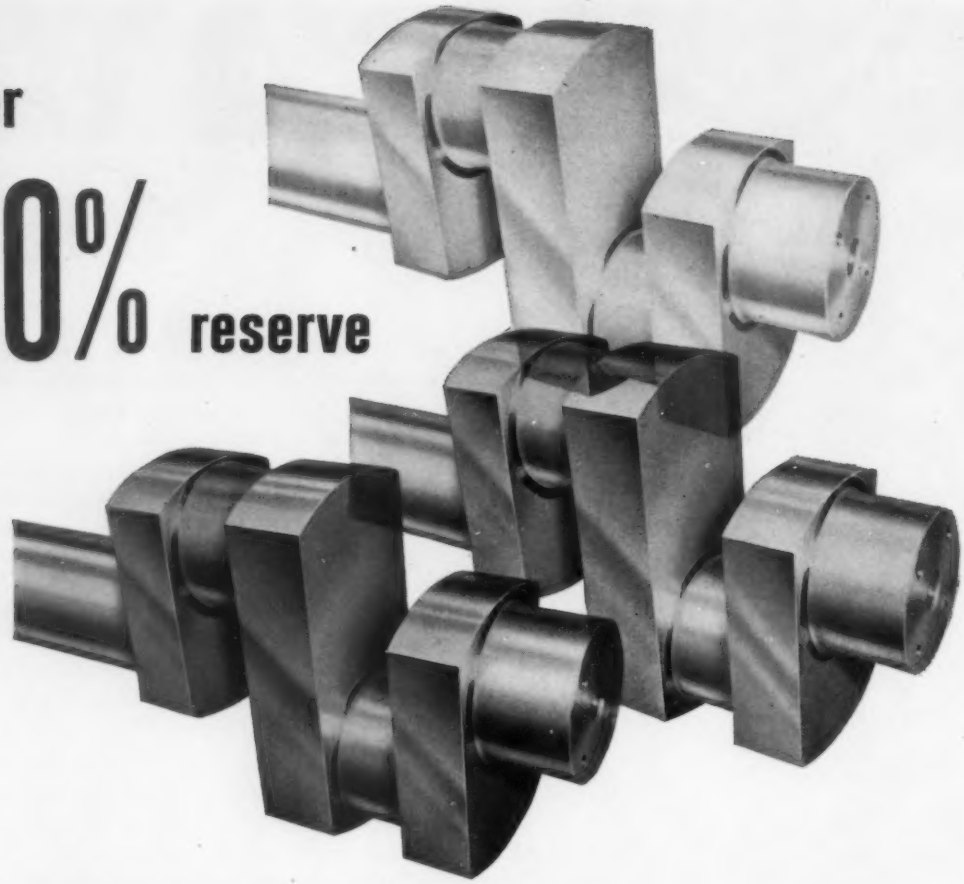
Next time you have a wire and cable problem, why not call on General Electric engineers to help you? Their experience and the tested quality of G-E cables can become an important factor in the efficient operation of your plant.

Write for free information on the specific wire and cable problems that interest you. Address Section W179-864, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Over 300% reserve



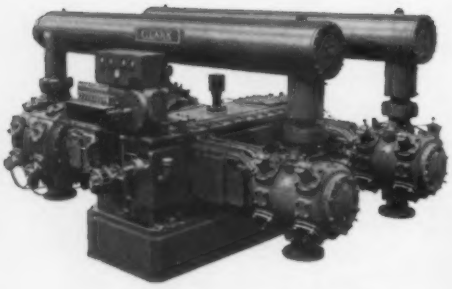
Built in the Crankshafts of many Clark Balanced/Opposed Compressor Models

Extra-heavy crankshafts are standard equipment on Clark Balanced/Opposed compressors . . . it's brought about by standardization.

All models of a particular stroke size have the same bearing and crankshaft diameter. As an example, the number one crankpin of all CMA models is capable of transmitting with complete safety 600 BHP. The CMA-2 rated at 150-300 BHP and the CMA-4 rated at 350-500 BHP therefore have a tremendous reserve. The same thing applies to the 14" and 17" stroke CRA and CBA models.

Rugged shaft construction assures maximum bearing life and minimum maintenance. It also eliminates the need for a bearing between opposing cylinder crankthrows which would double the force couple between opposing cylinders and in turn increase shaft stress and foundation requirements.

Your nearest Clark representative will be pleased to give you all the facts on the original Balanced/Opposed compressors, or write for bulletin 118.



CLARK 350 BHP BALANCED/ OPPOSED AIR COMPRESSOR

CLARK BROS. CO., OLEAN, NEW YORK
One of the Dresser Industries
Offices in Principal Cities Throughout the World

CLARK **Balanced/Opposed Compressors**

For more facts circle 516 on Reply Card

BULLETINS just released and of immediate plant interest

MATERIALS HANDLING

101 Overhead Cranes—Underhung overhead cranes with a broad range of applications are shown and described in 16-pp Bulletin U-200-1. Line drawings with dimension identification are given for each model followed by dimension tables including I-beam, hanger and wheel load data. Includes information on various types of hangers for monorails and underhung crane runways, also track and trolley data, electrical information. Chicago Tramrail Corp.

102 Power Conveyors—Bulletin 302, 24 pp, describes 19 types of power conveyors for handling everything from gas ranges to mushrooms. Includes size and dimension data plus installation photos. Portable, stationary, horizontal and inclined types are shown, plus floor-to-floor conveyors, power belt corners and power roller curves. Specialty items are shown, including suspended tray type elevators; barrel, keg and sack elevators; reciprocating hoists; live roller conveyors, Pres-Server conveyors; enclosed slat conveyor tables; steel wire mesh belt conveyors; chain conveyors, limit switch rollers. Harry J. Ferguson Co.

103 Steel Conveyor Belts—"A profitable approach to the selection of steel processing conveyor belts" is the subject of this 16-pp bulletin. Simplified selection, standard specifications, and installation information are included. Photos and diagrams illustrate the text. The Colorado Fuel and Iron Corp.

104 Dragline Conveyors—Trukveyors, a dragline conveying medium designed to reduce the unit cost of materials handling in warehouses and other areas, are illustrated and described in detail in 24-pp Book 2497. Presents both the over-head and in-the-floor types, discussing the components and furnishing valuable installation data. Trukveyor attachments are also shown. Link-Belt Co.

105 Truck Casters—Catalog S-56, 20 pp, contains design, dimensional and capacity data on a line of truck casters ranging from extra-heavy duty to light duty types. Full descriptions of each type are included, along with photos and drawings. Wheels, wheel mountings, and locks are also covered. The Bassick Co.

106 Hardware Chain Facts—Well illustrated and information packed, 16-pp Bulletin DH-176-A describes chains for industrial and other requirements. Contains data on construction features, applications, packaging, weights. Shows many combinations of standard and special assemblies. Such applications as repair links, rope snaps, utility chain, slip-and-grab hooks are covered. American Chain Div., American Chain & Cable Co., Inc.

PIPING AND VALVES

107 Automatic Valves—In clear concise language and with the aid of simple, easy-to-follow drawings, 8-pp Bulletin G-4 explains how the piston operating principle of company's automatic valves, and other design features, contributes to dependable, economical, operation. Golden-Anderson Valve Specialty Co.

108 Solenoid Valves—Condensed Valve Catalog 201, 32 pp, presents latest designs in company's line of two-, three- and four-way solenoid valves. Compiled for easy reference, this booklet contains engineering information, flow charts, operation and construction details. Fully illustrated, it also includes prices and a handy selection chart. Automatic Switch Co.

109 Directional Control Valves—Three- and four-way directional control valves for fluid power systems up to 3000 psi are described in 16-pp Bulletin 80300. Included are details of valve body construction and functions of standard and special plungers. Four styles of operators—mechanical, manual, hydraulic and solenoid pilot—are featured, and each style is described, type designation, dimensions and J.I.C. symbols included. The Oilgear Co.

110 PVC Pipe, Valves, Fittings—This 8-pp memorandum features engineering data on polyvinyl chloride pipe, valves and fittings. Covers in detail the corrosion resistance, general properties, fabricating characteristics and economies of unplasticized PVC. Peter A. Frasse and Co., Inc.

111 On Concrete Pressure Pipe—The story of pre-stressed steel-cylinder pipe for water lines is told in this 24-pp illustrated booklet. Photos and sketches show how prestressing works, how the pipe is manufactured, and how easily it is laid. Long life, operation and maintenance advantages, and long-run economy of concrete pressure pipe are discussed. Available types and sizes are cataloged. Price Brothers Co.

112 Lead Waste Connections—Lead Construction Bulletin 1, "Specification for Lead Waste Connections for Plumbing Fixtures with Integral Traps," provides an easy-to-use specification for use of lead connections for water closets and similar fixtures. Practical tips on how such connections are made to cast iron, copper and galvanized iron are also included. Lead Industries Ass'n.

PUMPS, PUMPING

114 Cradle-Mounted Pumps—Twenty-pp Form 7223-B covers cradle-mounted centrifugal pumps having capacities from 5 to 2800 gpm and pressures of 10 to 525 ft total head. A tabulation of pump types with rating aids in selection. A cross-section view points up design features common to this line. Various models are described along with their applications, and typical installation views provided. Also, performance tables and dimensions are included and available modifications for special applications described. Ingersoll-Rand Co.

115 Metering Pumps—Twelve-pp Booklet 600 features metering and proportioning pumps as used in water conditioning. Illustrates typical installations for the injection of inhibitors in water conditioning systems. Includes pump specifications, a table listing chemicals most commonly used in water conditioning, what they are used for, and pump construction best suited to inject them. Hills-McCanna Co.

116 Centrifugal Pumps—Bulletin W-306-B3DP features engineering data on company's centrifugal pumps for air conditioning systems, available with heads to 120 ft and capacities to 240 gpm. Graphically illustrates dimensions and gives rating curves. Worthington Corp.

117 Close-Coupled Pumps—Eight-pp Bulletin 710.1 shows construction features and provides performance data and specifications on close-coupled centrifugal pumps. These pumps are adaptable to general industry as well as chemical plants, refineries, paper mills, breweries. Pumps in this line are single stage with enclosed impeller, available in 20 sizes with capacities to 2000 gpm, heads to 400 ft. Goulds Pumps, Inc.

118 For Pumping, Sewage Treating—Manual 1114 is a 16-pp reference manual dealing with pumping and sewage treatment equipment. Gives detailed information for determining capacities of, and selecting vertical wet pit pumps and pneumatic ejectors. A selector guide lists products, model numbers, and specific technical bulletins covering these products. A section of booklet is devoted to sewage and industrial waste treatment systems. Yeomans Brothers Co.

119 Canned Motor Pump—Bulletin 1060 describes and illustrates company's Series E low-cost, compact canned motor pump less than 8 in. in length, a mere "bump in the pipeline." Complete details on performance, NPSH requirements, materials of construction, power inputs, temperature and pressure limitations, and dimensions are given. Chempump Corp.

120 Process Pumps—Circular 184, 12 pp, features standard centrifugal process pumps for industrial, refinery and general service. Advantages of design with interchangeable parts are outlined, and pump sizes, head-capacity range charts, and sectional views and parts lists are furnished. Dean Brothers Pumps Inc.

121 Submersible Pumps—Bulletin P55-123, 12 pp, describes advantages of company's submersibles and tells how they solve various pumping problems. Design features are illustrated through cutaway views. Four basic types are shown, and a handy selection chart is included. Byron Jackson Co.

PACKINGS, SEALS

122 Valve Stem Packing—Form 6901 describes two general types in which valve stem packings are available (braided of asbestos yarns, and plastic), the manner in which they are made, and illustrates shapes most commonly used, as well as listing size limitations. It also provides a recommendation chart for standard items when used against various fluids and gases. Packing Div., Raybestos-Manhattan, Inc.

124 O-Ring Data—Engineering Handbook 525, 50-pp, features charts, illustrations graphs and engineering data on development of the "O" ring seal design. Information on internal and external grooves, gland finishes, chamfers, selection of gland, piston rod, and cylinder materials and lubrication is included, as well as silicone rubber products, custom molding, tables of decimal equivalents, temperature conversion table, circumference and area circles. Plastic and Rubber Products Co.

MECHANICAL POWER TRANSMISSION

125 Power Transmission Equipment—Form 1200, 12 pp, features flexible couplings, variable speed pulleys and transmissions, and universal joints and motor bases. Information includes operating data, horsepower ratings, sizes and types for countless applications and widely varying working conditions. Lovejoy Flexible Coupling Co.

126 Worm Gear Drive—Advantages of company's worm gear drives are outlined in illustrated Form 521. Typical applications are described and various types of units are pictured. The Cleveland Worm and Gear Co.

127 Fluid Drives—Bulletin 9919 covers use of company's Gyrol fluid drives in the petroleum industry and describes their advantages as applied to pipe-line compressor stations, refineries and other petroleum applications. A cross-section drawing and flow diagram illustrates operation. American Blower Corp.

128 Internally Geared Power—Featuring latest design improvements in gearmotors and embodying 60 multicolor illustrations, 16-pp Form 1880 shows comparative advantages of gearmotors, lists ratings from ½ to 30 hp with gear ratios as high as 10:1. Cross-sectional details and enlargements of outstanding features are included, as well as discussion of the application of elliptoidal helical gears and a chart graphing degrees of tempering and hardening of gear teeth. U. S. Electrical Motors Inc.

You'll find two postage-free Reader Service Cards on pages 187-188. Use them for ordering these bulletins—just circle the item numbers of those you want. You may also use the cards for requesting advertised catalogs.

BULLETINS

(Begins on page 23)

129 Variable Speed Drives—Sixteen-pp Bulletin 1600-B7 P describes variable speed drives with touch control, giving information on features, operating principle, design, component parts, definition of engineering terms and formulas, selection tables and graphic illustrations of drive dimensions. It also covers modifications and accessories. Worthington Corp.

130 On Flexible Shafts—Engineering Bulletin 570 shows typical installations using flexible shafting. Furnishes information on all sizes of shafting from ⅛ to 1⅝ in. in diameter, for power drive or remote control. Charts aid in correct size selection for a particular job. Standard fittings and ferrules available for integral design connections shown. Stow Mfg. Co.

131 Flexible Couplings—Bulletin MC-100 describes standard and special miniature couplings for power transmission. These couplings can be used on servo-mechanisms computers and other small devices, and are designed for speeds to 50,000 rpm. Material specifications, dimensions, bore size and prices are shown. Thomas Flexible Coupling Co.

ELECTRICAL

132 Motors for Many Jobs—Bulletin 1878 is a colorful, 8-pp revamped publication including a more complete line of company's motors. Descriptions and illustrations cover open-type Uniclosed designs, totally-enclosed and explosion-proof types, Varidrives, Synchrogears, and right-angle models; also vertical motors and Verticlosed hollowshaft types. U. S. Electrical Motors Inc.

133 All-Weather Motors — Bulletin 470-A features 10 and 15 hp all-weather high torque, capacitor-run single-phase motors. Describes such features as protection against weather, debris and small field animals, others. Robbins & Myers, Inc.

134 Motor Control Centers—Catalog 2-2000, 28 pp, features a compact motor control units for industrial, and other applications. Describes 7-in. high motor control units, believed the smallest production-built plug-in types available and which permit plug-in of as many as 20 NEMA size 1 combination motor starters in a standard 90 in. back-to-back section. Construction details, components, and engineering data, including dimensions and suggested specifications, are given. Federal Pacific Electric Co.

135 Metal-Clad Switchgear — Design and construction features of indoor and outdoor 13.8-kv horizontal drawout metal-clad switchgear with Ruptair magnetic circuit breakers are described in Bulletin 18B8142. Shows how heavy component parts are located toward the bottom of the breaker for a low center of gravity and good stability. Also explains quick disassembly of breaker and operational advantage of horizontal contact separation. Allis-Chalmers Mfg. Co.

136 Specifying Relays—This 12-pp article on specifying relays covers various factors that should be considered in selecting an electrical relay for given applications, including circuit characteristics, type of switching, actuation power, operating speed, duty cycle, life expectancy, environmental conditions, physical requirements and cost. Photos of various types of equipment are included. American Machine & Foundry Co.

137 Key Switches—Described in this 24-pp catalog are key switches for electromechanical switching purposes. Fully illustrated, provides necessary ordering information on cam lever keys with surface or flush mountings, twist type and push button keys on individual mountings or in strips of standard size. Also gives data on key mountings and key boxes, including diagrams of key box applications. Stromberg-Carlson Co.

138 Automatic Transfer Switch—This illustrated bulletin covers circuitry and mechanical features of the Trans-O-Matic automatic transfer switch. Describes applications, and includes schematic drawings showing optional transfer circuits available, and line drawings illustrating dimensional details. Lake Shore Electric Corp.

139 On Industrial Capacitors—The **Capacitor Digest** (Bulletin GED-2978), contains a collection of some of the best, recent trade-magazine stories on the subject of industrial capacitors. Stories in the digest point out how industrial capacitors installed at the load in a plant can pay a high return in power cost savings, released additional capacity and better operating conditions. General Electric Co.

140 Improved Regulators—Eight-pp Bulletin GEA-6386 introduces company's RM (repetitive manufacture) line of induction voltage regulators. Describes two regulators which, at lower cost, replace nine former station ratings. The RM regulators are designed to give Class I accuracy as defined by ASA, and to carry increased future loads without change of equipment—and on existing feeders to carry more load at lower cost. General Electric Co.

141 Transformers and Autotransformers—Twelve-pp Bulletin GED-2506A gives at-a-glance information on bucking or boosting voltage, connection diagrams, kva ratings, and other features on selection of dry-type B-B transformers, autotransformers. General Electric Co.

142 Stationary Power Batteries — Exide-Tytex batteries in plastic containers for stationary power applications are described in Form 5907. Lists their advantages and discusses design features including the positive plate combination of active material and a grid made of Sylvium—a new and durable alloy. Exide Industrial Div., The Electric Storage Battery Co.

143 Test Instrument Guide—Instruments for testing and calibrating current actuated protective devices are described in a 68-pp Catalog 3561. Covers standard and special equipment for safety testing protective relays, oil circuit reclosers and related devices, and contains product descriptions, applications recommendations, illustrations, schematic diagrams and technical data. Catalog also provides a recapitulation of relay testing practice today, with recommendations on rapid and safe new techniques to inspect critical protective equipment, as required. Multi-Amp Corp.

144 Fault Locator—This 12-pp booklet describes the **Brunt Faultfinder**—a combination ground detector and fault locator used to detect and locate accidental grounds on normally ungrounded electrical power circuits of up to 600-v a-c or d-c while these circuits are energized. Covers such aspects as interpretation of signal and determination of fault, lists applications and includes service instructions and specifications. Parr Mfg. Corp.

145 Aluminum Conduit—Major advantages of company's aluminum electrical rigid conduit are discussed in 8-pp Form AD 283, including corrosion resistance, light weight, nonsparking and nonmagnetic properties. Includes installation suggestions, dimensions and weights. Aluminum Co. of America.

LUBRICATION

146 Lubrication System—Bulletin 1450 contains design and operation information on company's lubrication and coolant systems, with pictures of typical installations and a diagram of a mill lubrication system. Also describes compact packaged lubrication system designed to meet the need for an economical, full pressure feed lubrication system in capacities to 50 gpm. Dravo Corp.

147 To Rout Sludge—How to clean sludge out of hydraulic and lubrication systems without shutting down machines is told in Technical Bulletin 44. It also tells how continued use of company's detergent oils helps to keep equipment clean. Sun Oil Co.

INSTRUMENTS, CONTROLS

149 Remote Control System—Plug-in package remote control system for two-position discreet operation of starters, pumps, valves, loaders, gates, operators is featured in this illustrated brochure. Describes principle of operation and includes specifications. Sparton Control Systems Div., The Sparks-Withington Co.

150 Temperature Regulator—Bulletin 500 offers complete information on the Stacon Series V self operating temperature regulator for steam, water, gases and all fluids not corrosive to brass. Contains such data as weights and dimensions, pressure and temperature ratings, accessories, construction and performance characteristics. A. W. Cash Co.

151 Gas Regulators—Revised Bulletin 1059, 12 pp, includes photo-illustrated descriptions of company's new 250-lb type high-pressure model of the "1001" regulators which offer a maximum capacity of 200 psi and outlet pressure range from 5 to 60 psi and are adaptable to natural, manufactured or LP gas. Bulletin gives complete maximum capacity tables for all models along with explanation of the tables and the ratings based on them. Meter and Valve Div., Rockwell Mfg. Co.

152 Armored Rotameters—Twelve-pp Bulletin 130 contains photos and cutaway drawings of company's armored rotameters and also describes indicating and transmitting extensions available. Includes details of design and construction, capacity charts and principles of operation. Brooks Rotameter Co.

153 Smoke Density Indicator—Details of company's Fireye FE-3 smoke density indicator system are presented in Bulletin CM-22. Illustrated with photos and drawings, bulletin gives operating and specification data. Installation information is provided in schematic drawings. Three smoke recorders for use with the system are described. Combustion Control Div., Electronics Corp. of America.

154 Automatic Coal Scale—Bulletin 0352A, 16 pp, describes operation, components and auxiliary equipment for two models of high-speed automatic coal scales. Feeding, weighing, and discharge cycles of the scale are illustrated, as well as such components as belt feeder, weigh hopper, housing and controls, and operating levers. Richardson Scale Co.

LIGHTING

155 Lamps for Industry—Eight-pp Bulletin 66 presents manufacturer's line of lamps for industrial service, indoors and outdoors. These include mercury vapor lamps, weatherproof floodlights, high bay reflector lamps, spotlights, infra-red lamps, spatterproof lamps, and others. Illustrated with photos, curves indicating candlepower, brief text covers features and applications of each type. Radiant Lamp Corp.

156 Outdoor Floodlight—Twelve-pp Bulletin GEA-6435 discusses industrial and other applications of a new general purpose outdoor area floodlight and cites its outstanding features. Describes in detail the efficiency, low maintenance costs and optimum beam candlepower distribution of the unit. A classification and application guide shows most suitable uses for this and other floodlights. General Electric Co.

WATER TREATMENT AND WASTE HANDLING

157 Deaeration—Why? How?—Publication 4650 explains in capsule form the fundamentals of deaeration and why it is so necessary in water conditioning. Principles of operation as well as advantages and application of various methods are discussed. Cochrane Corp.

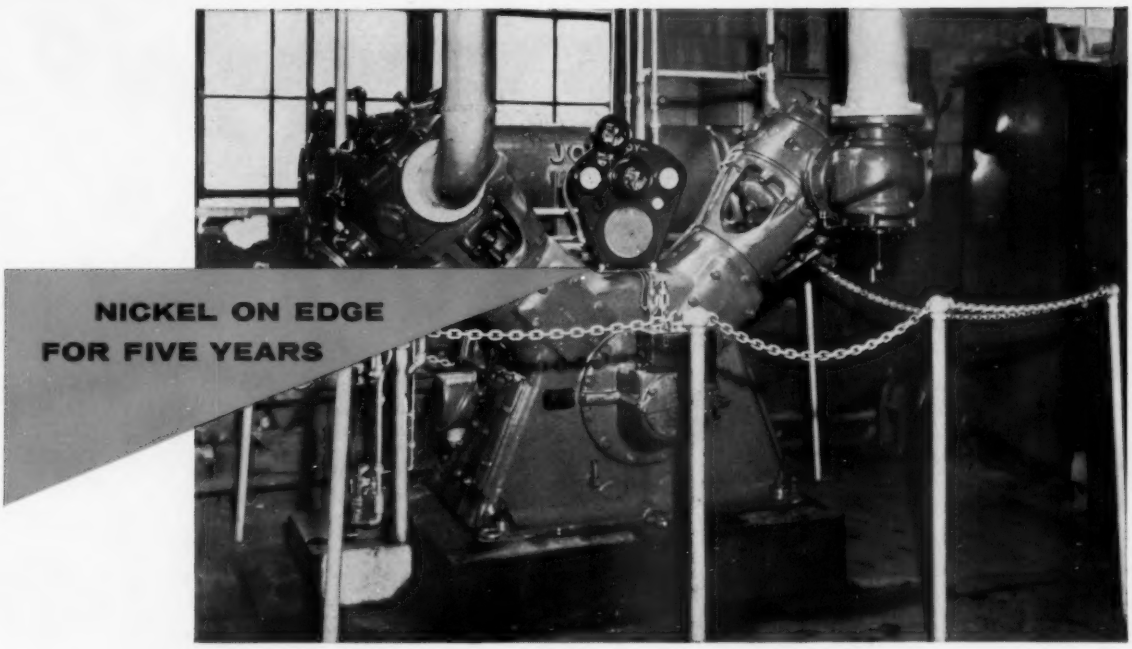
158 Pressure-Type Filters—Twelve-pp Bulletin WC-107A describes the uses, design features and engineering details of pressure sand gravel filters. Details of accessory equipment, the different types of controls available and a detailed table giving capacities, sizes, and space requirements are included. Cutaway views of horizontal and vertical filters are shown as well as details of strainers, distributor systems and piping. Graver Water Conditioning Co.

159 On Algae Control—A simple, low cost way to stop algae problems in cooling systems through use of company's 120 Series algaecide is described in Bulletin 28X8434. This algaecide is a complex organic rosin base liquid described as simple to apply and safe to use. A table shows its effectiveness on six species of algae. Allis-Chalmers Mfg. Co.

160 Waste Treatment Unit—A low-cost package unit for removal of solids from waste water by settling is covered in Bulletin 315-92. Rex Verti-Flo, bulletin explains, is a self-contained packaged unit in a steel tank featuring ease of operation and designed to handle industrial plant water clarification, process water reclamation, antipollution. Chain Belt Co.

(More Bulletins on page 189)

Proof... the JOY WN-112 COMPRESSOR is Vibration-free



A nickel was balanced on edge on this compressor (American Tank & Fabricating Company) when it was started up five years ago. It is still standing there!

VICE PRESIDENT GEORGE F. FRANCK, of American Tank & Fabricating Company, Cleveland, writes about his Joy Compressor:

"Although the WN-112 has been in constant use for five years, we have experienced no trouble. It is vibrationless in operation . . . we are delighted with its performance."

The Joy WN-112 is a heavy-duty, continuous service, double-acting, water-cooled compressor with capacity from 378 to 974 CFM, 125 psi. Its vibrationless performance is the result of balanced V-vertical cylinder design with flange-mounted motor.

Other features of the WN-112 that assure efficient, quiet operation and long service are the exclusive Joy "Dual Cushion" valves, the *replaceable* cylinder and crosshead liners, full force-feed lubrication (even to the crosshead face), and oversize non-adjustable spherical-type main bearings.

For complete details on Joy WN-112 Compressors, write **Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Write for FREE Bulletin 90-15

Consult a Joy Engineer

For Air and Gas Compressors, Oxygen and Nitrogen Generators, Vacuum Pumps and Boosters, Conveyors, Fans, Electrical Connectors, Hydraulic Fittings and Hose Assemblies.

WSW 16093-90

JOY

SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

For more facts circle 517 on Reply Card

FOAMGLAS®

the cellular, stay-dry insulation

STAYS DRY—Cut a piece from your sample. Place it in water. Note how the hermetically-sealed glass cells filled with dead air keep it afloat. Weight it down for days, weeks or longer if you like. Remove the weight and it bobs back to the surface . . . proof that the sealed cells have absorbed no water, still have their original insulating efficiency.

VAPOR-PROOF — With a nail file, cut a ¼" thick slice from your sample. Hold it to your lips and try to blow smoke through it. The smoke won't penetrate . . . proof that FOAMGLAS is a positive vapor barrier in itself.

STRONG AND RIGID — Place your FOAMGLAS block on the floor. Stand on it. Note how it supports your weight without crushing. Compressive strength is over seven tons per square foot . . . making it ideal for load bearing applications.

WON'T BURN — Hold a flame to your sample. You'll see at once that it does not burn . . . an important safety feature in all construction. It's even acid-proof and rodent-proof as you can prove if you happen to have a vial of acid or a pet rat handy.

Send for a sample and make these simple tests!

Prove to yourself that FOAMGLAS is your ideal insulation!

Let us send you a free sample of FOAMGLAS. Use it to make the few simple tests illustrated. You'll prove that this unique cellular glass insulation has exactly the right combination of properties to assure you of these vital benefits: constant insulating efficiency . . . long, maintenance-free life . . . strength and rigidity for a variety of structural applications . . . ease of handling and installation.

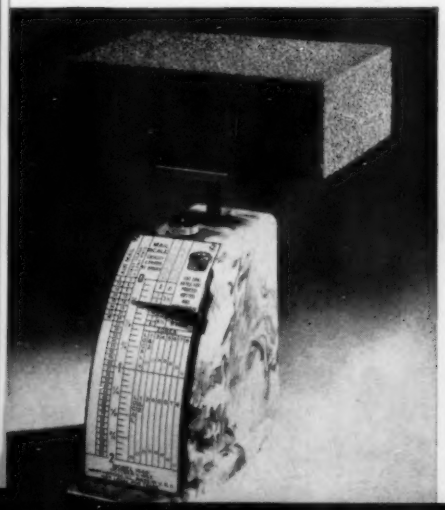
Thousands of actual users have proved in actual performance the benefits so clearly demonstrated by these tests. No wonder, then, that new users every day are picking FOAMGLAS to insulate the roofs, ceilings, walls and floors of all types of buildings, low temperature spaces, piping and equipment. Send for a sample today and make your own tests. Use the handy coupon, or write . . .

Pittsburgh Corning Corporation

Department PE -86, One Gateway Center
Pittsburgh 22, Pa.
In Canada: 57 Bloor Street West, Toronto; Ontario

LIGHT WEIGHT — Just pick up your sample to see how light and easy to handle it is. Check actual weight on your company's postal scale if you wish. The density of FOAMGLAS is only 9 pounds per cubic foot.

EASY TO SHAPE AND CUT—Shave some strips off your sample with an ordinary paper clip . . . workmen use knives, saws or trowels for quick shaping and fitting on the job.



Pittsburgh Corning Corporation
Department PE-86, One Gateway Center
Pittsburgh 22, Pennsylvania
In Canada: 57 Bloor St. W., Toronto, Ontario

Please send me a sample of FOAMGLAS for testing.

Name_____

Company_____ Title_____

Address_____

City_____ Zone___ State_____

For more facts circle 518 on Reply Card

"LUBRIPLATE, THE OUNCE OF PREVENTION"

says
VULCAN IRON WORKS, INC.
of Chicago, Ill.

—a leading manufacturer of pile driving and extracting equipment

"For many years we have used LUBRIPLATE Lubricants for shop assembly, and have recommended them to our customers through your LUBRIPLATE Tag Plan. Our experience shows that if the proper lubricants are used from the beginning, there are fewer problems and parts replacements later. We consider LUBRIPLATE to be the best possible ounce of prevention."—
H. G. Warrington, Vice-Pres.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE

LUBRIPLATE LUBRICATION

MAKES CARS AND TRUCKS RUN BETTER AND LAST LONGER

LUBRIPLATE H.D.S. MOTOR OIL . . . THE OIL THAT NEEDS NO ADDITIVES

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Send for free "LUBRIPLATE DATA BOOK" . . . a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

For more facts circle 519 on Reply Card

BACKTALK about our past issues

Edited by Marjorie E. Weissman

Anti-Friction Bearings

PLANT ENGINEERING:

"Some time ago, we furnished material to Mr. E. P. Stahl of the Garlock Packing Co., Palmyra, N. Y., for use in an article he was preparing about bearing mounting parts and accessories.

"Mr. Stahl recently advised us that the article would appear in the May, 1956 issue of PLANT ENGINEERING under the title, 'Mounting Anti-Friction Bearings—Correct Accessories, Parts and Tools Are Important.'

"We are most interested in seeing the story. Would it be possible for you to send us a few tear sheets for our files?" *Leonard Kirsch, Publicity Dept., Waldes Kohinoor, Inc., Long Island City N. Y.*

► The information Mr. Kirsch received regarding the article is correct and tear sheets have been sent him with our compliments.—*Editors.*

Vibration Isolators

PLANT ENGINEERING:

"Would you please send us a tear sheet and further information on the article 'Instrument Isolation' by S. L. Perlow, which appeared in the April, 1956 issue of PLANT ENGINEERING." *J. N. Jaques, Plant Engineer, Lakeside Laboratories, Inc., Milwaukee Wis.*

► This request has been forwarded to the author of the article at The Korfund Co. 48-15 32nd Place, Long Island City 1, N. Y.—*Editors.*

Permission Granted

PLANT ENGINEERING:

"We received the May issue of PLANT ENGINEERING containing the article 'Epoxies Get Tough Guard Duty,' discussing Epoxylite materials. We were very impressed with the article and layout and are appreciative of the effort you expended on it. In fact, the presentation is so effective, that we received a request for more information from one reader even before we received a copy of the magazine.

"Because it is so effective, we would like permission to reprint the article by photo offset. On the reprints of course, PLANT ENGINEERING will be given full credit." *Kris Neville, Advertising Mgr., The Epoxylite Corp., Montebello, Calif.*

► As usual, we are happy to grant permission to reprint, with credit, an article from PLANT ENGINEERING.—*Editors.*

Maintenance Again

PLANT ENGINEERING:

"Your article, 'Maintenance—According to Schedule,' in the May, 1956 issue of your magazine was noted with considerable interest. We would like to compliment you on the attractive and highly interesting manner in which the material was presented.

"Would it be possible to have about six tear sheets of this article?" *John B. Fergison, Information Service, Hyster Co., Portland, Ore.*

► We are pleased to send six tear sheets of the article on maintenance, to Mr. Fergison, with the compliments of the editorial department.—*Editors.*

Drive Against Waste

PLANT ENGINEERING:

"I enjoyed the article in the June, 1956 issue of PLANT ENGINEERING by Maurice D. O'Hern, titled, 'Let's Take a Look at Ourselves.' I would appreciate it very much if you have any reprints of it that you would make one available to me.

"We are also starting an intensive drive on scrap and waste and I am wondering if you have any information, literature, articles, etc., that you could forward to us." *R. L. DeMunck, Plant Engineer, Pillsbury Mills, Inc., Hamilton, Ohio.*

► Tear sheets of "Let's Take a Look at Ourselves" and additional tear sheets of several articles from past issues of PLANT ENGINEERING which might be helpful in setting up a salvage program, have been sent to Mr. DeMunck.—*Editors.*

PLANT ENGINEERING:

"Please send us a tear sheet of the article, 'Let's Take a Look at Ourselves,' appearing in the June, 1956 issue of PLANT ENGINEERING." *C. I. Fellers, Assist. Supt., Plant Engineering & Maintenance, Eastman Kodak Co., Rochester, N. Y.*

Nuclear Energy Course

PLANT ENGINEERING:

"Please send me further information on the home study course on nuclear energy mentioned in the Backtalk section of the May, 1956 issue of your magazine." *H. J. Mealey, Maintenance Supervisor, Vick Chemical Co., Philadelphia, Pa.*

► Basic information on nuclear energy is being offered as a 39-lesson home study course by the Institute of Scientific Studies, 248 Arlington, Elmhurst, Ill. The course is also available to company and industrial groups.—*Editors.*

Filter Facts for Air Force

PLANT ENGINEERING:

"In the June, 1956 issue of PLANT ENGINEERING, on pages 100 and 101, there is an article titled 'Filter Washing and Oiling.' It was written by H. H. Baxter, Jr., Plant Engineering, Sandia

BETZ • *A Great Name In Water Conditioning*

They all work for you!

It takes the combined ability and experience of many people to engineer effective water conditioning.

Few plants, however, can afford to maintain or establish an internal staff capable of supplying the constant flow of engineering knowledge, the diversification of thinking, the thousands of creative and supervisory man-hours that are necessary to the engineering, planning, and control of an effective water conditioning program.

By assigning the responsibility for result-getting water conditioning in your plant to the Betz Organization, you gain immediately the services of field, staff, and consulting engineers, researchers, chemists, and production personnel . . . *plus* the basic objectivity of an "outside" organization providing individual attention to your individual problems.

What's more, the services of these team specialists are available to you *without actually putting them on your payroll!*

Whether your problem requires boiler or cooling water conditioning, Betz completely-integrated service brings into play techniques, methods, and engineering that can make all the difference in *results*.

A Betz District Engineer, one of the many important members of the Betz service "team", will be happy to give you the details of our result-getting service. Why not call him in *today?*

W. H. & L. D. BETZ, Gillingham & Worth Streets, Philadelphia 24, Pa. In Canada: BETZ Laboratories Limited, Montreal 1.

BETZ

CONSULTANTS ON INDUSTRIAL WATER PROBLEMS

For more facts circle 520 on Reply Card

"Airco 312 Electrodes are my choice for hard-to-weld steels"

The Airco 312 is an all-position mild steel electrode designed to produce weld metal possessing not only excellent mechanical properties but also low hydrogen content. The arc action is relatively quiet, resulting in low spatter. The molten steel is not turbulent. For welding steels when the exact composition is not known.

This is but one of many electrodes in Airco's complete line that also includes stainless steel, hard-facing, cast iron, general and special purpose electrodes. Send for the free Airco Electrode Guide which will help you select the right electrode for your specific job. Request catalog 1318-PE.

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BACKTALK

Corp., New Mexico and contains a considerable amount of interesting data involving their method of servicing air filters. We produce the filters and the filter servicing equipment referred to.

"We do a considerable amount of work with the U.S. Air Force and in recent discussion with their civilian head of air conditioning and refrigeration, we were asked if we would secure your permission to reproduce this article so that the copies could be distributed at a forthcoming regional meeting of A.I.O. officers. We could also advantageously use copies for sales promotional purposes within our organization." *G. R. Holtz, Farr Company, Manufacturing Engineers, El Segundo, Calif.*

► As usual, we are happy to give permission to reprint an article from Plant Engineering, provided credit is given to the source.—*Editors.*

Maintenance Incentives

PLANT ENGINEERING:

"I wish to acknowledge the tear sheets of the article on our incentive plan, 'Maintenance Gets Premium Pay Plan' that appeared in the June, 1956 issue of PLANT ENGINEERING.

"I have looked this over very carefully and think it is a very worthwhile article indeed. We certainly appreciate your cooperation in preparation of same. We are interested in obtaining about 50 copies of the article for distribution to our sales force and plant personnel." *G. B. Michie, Vice President, Electro Refractories & Abrasives Corp., Buffalo, N. Y.*

► As requested, 50 copies of the article have been sent to Mr. Michie.—*Editors.*

Miscellany

PLANT ENGINEERING:

"Please forward four copies of your article entitled 'Plastic Skylights Do the Trick,' published in your June, 1956 issue." *W. A. Salzmann, Plant Engineer, International Harvester Co., Rock Island, Ill.*

PLANT ENGINEERING:

"We understand that the June, 1956 issue of your fine magazine contains an item about the release of our new technical pamphlet entitled 'What You Should Know About Expendable Pallets.' This item appears on page two of that issue. May we have a tear sheet of this item for our files?" *William H. Sardo, Jr., Secretary-Manager, National Wooden Pallet Manufacturers Association, Washington, D. C.*

PLANT ENGINEERING:

"Please send us three sets of tear sheets of the article entitled 'Industrial Pushbuttons—Proper Selection of These Ordinary Gadgets Is Important' by A. E. Schueler, which appeared in the June, 1956 issue of PLANT ENGINEERING." *Jeanne F. Kandsberger, secretary to N. Hunt Gwyn, Technical Publicity, Westinghouse Electric Corp., Pittsburgh, Pa.*

Pushbutton Circuit

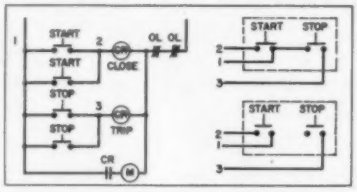
PLANT ENGINEERING:

"In the article 'Industrial Pushbuttons,' which appeared in your June issue, Mr. A. E. Schueler, the author, gives a circuit for two-station operation which makes it necessary to rewire the motor starter.

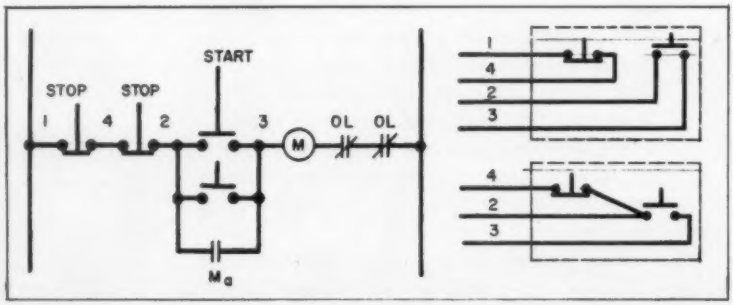
"The starter need not be rewired if the proper pushbuttons and control schematic shown are used.

"Also, Fig. 8 is incomplete as Point 1 is common to the start and stop buttons of both stations." *C. A. Prior, Staff Engineer, Diamond Alkali Co., Cleveland, Ohio.*

► We are indebted to Mr. Prior's sharp eye and appreciate his interest.—*Editors.*



Original diagram appearing in article



Mr. Prior's revised circuit for pushbutton control by means of two stations

The Power Drive that Gives You Everything!

New RIDGID No. 200 Tripod Power Drive with Folding Tray

Really Portable—Lightweight, legs and tray fold in snugly, handy handle for carrying.

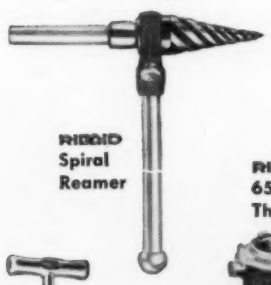
Easily, Quickly Set Up—Built-in folding tray and legs open up for business instantly—all one unit, no loose parts.

Extra Rigidity—Open tray holds legs in strong, solidly rigid stance, adds strength. No front leg to obstruct swing of die stock handles.

Fast Easy Speed Chucking—Guaranteed to grip tight forward and reverse—no slip, even with geared tools. Replaceable insert jaws for long service.

Extra Power—Motor has larger long-life brushes, longer commutator, won't bog down under extra load.

Power for any hand pipe tools ⅛" to 2" pipe, ¼" to 2" bolts; geared tools to 12".



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RIDGID Heavy-Duty Pipe Cutter

You can't beat it for performance, easy work and durability. Buy it at your Supply House . . . much the most for your money!

RIDGID Work-Saver Pipe Tools

The Ridge Tool Company, Elyria, Ohio, U.S.A.

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the NEW topping for cement floors indoors or outdoors

Super Bondsit® won't chip, dust, or rust

Here's a versatile new topping for cement floors—anywhere. It's just as effective and durable outdoors or indoors. It won't chip. It won't dust. It won't rust. It's chemical, spark, and skid resistant. Super Bondsit is an emulsion containing liquid Latex that makes an unbeatable concrete floor topping or patch when incorporated into cementitious mixtures.

Now with only one material—versatile Horn Super Bondsit—you can solve the varying concrete floor patching and topping problems in all these industries: • paper • rubber • textile • electrical • dairy • sugar • drug • chemical • and in many more industrial and commercial buildings, as well as for playgrounds and tennis courts. For full information write to: Dept. H27-85.

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For more facts circle 523 on Reply Card

For more facts circle 524 on Reply Card ——→

"Let me show you how we solved all our plant heating problems with Reznor Gas Unit Heaters"

"Our engineers were always complaining about the cold until we installed Reznor heaters in the drafting room"

"Our steam heating system does a good job out in the plant where temperature levels don't need to be as high or as steady, but we've always had trouble keeping office workers comfortable. So we installed these Reznor gas unit heaters in the drafting room. It worked out so well we're using Reznor heat in all office areas now. Reznor heaters are doing a better job for us in these areas because they respond instantly, automatically to the temperature requirements of their immediate surroundings. Reznor suspended units are fine here in the drafting room. In other office areas, where floor space is at less of a premium and appearance more important, we've used Reznor floor models. We even installed them in the executive offices, and they've helped sell management on Reznor heating."

"Rust was eating away our warehouse stocks; these Reznor heaters put a stop to it"

"Rust used to be a serious problem at both ends of our production lines. It attacked our supply of sheet metal. And it caused trouble in the warehouses where we stockpile our finished products. One way or another rust was costing us thousands of dollars a year; we could have afforded to pay plenty to stop it. But we didn't have to! Reznor gas unit heaters proved to be the efficient, economical answer to our rust problems. We installed a few Reznor heaters in our steel warehouse and a few more here in our finished products warehouse, set the thermostats and forgot them. Rust is no longer a problem. The heaters are no problem, either. Operating costs are lower than we had expected, and maintenance costs have been zero."

"Our boilers didn't have the extra capacity to handle this plant addition . . . Reznor heaters were the perfect solution"

"When we completed this new plant addition, our boilers weren't able to take the additional heating load. It wasn't going to be economical to add another boiler, or to replace one of our boilers with a boiler of larger capacity. Reznor heaters were the perfect solution for our problem. Eighteen 150,000 BTU Reznor heaters gave us the required capacity and they maintain an even, comfortable temperature throughout the new section of the plant. Installation costs were surprisingly low. Operating cost has been less than that for the same capacity from the steam system, and we've had absolutely no maintenance work to do. When our present boilers need replacement, we'll probably switch the whole plant to Reznor gas unit heating."

"Heat loss through these shipping room doors was tremendous until Reznor suggested this answer"

"Until these Reznor heaters were installed, our shipping room crew might as well have been working outside during cold weather. Whenever those big doors were open, the cold wind came blasting in, making everybody uncomfortable, unhappy, and inefficient. Reznor gas unit heaters have eliminated all that. Installed so they discharge across the door areas, they lay down a curtain of warm air which keeps winter outside where it belongs. And they operate completely automatically . . . putting out a powerful blast of heat within a few seconds after the doors are open. The lesson we learned here has been applied to eliminate trouble spots in other parts of the plant, too. It's paid off in better health, morale and efficiency among our workers."

"We saved $120,000 here by installing Reznor heaters instead of replacing a worn-out boiler"

"When the old heating boiler at this plant gave out, we were told it would cost $150,000 to replace it. Then we discovered we could have a Reznor heating system for approximately one-fifth of that cost. It's a big building . . . 165,000 square feet of space to be heated. It took 64 Reznor heaters and over 20,000 feet of pipe to do the job, but we saved $120,000 on equipment and original installation. And we're saving a lot more on operation and maintenance costs. For example, we saved $15,000 a year in salaries by eliminating the four men formerly needed to operate the boiler room. And the plant is more comfortably heated than it ever was before."

"We select Reznor heaters to do the whole job at our new East St. Louis plant because . . ."

"All the experience we've had with Reznor in our other plants has been 100% good. And when we added up the pros and cons on the heating system for this new plant, they came out heavily in favor of Reznor again. Here's some of the reasons why: Lower original equipment costs. Much lower installation costs. No valuable floor space required for any heating equipment, no space required for fuel storage. Low fuel costs. No maintenance problems — maintenance is mostly a matter of one cleaning a year.

"Dollars and cents clinched the job for Reznor, but there are other advantages, too. Worker comfort is important to us, and everywhere we've tried it, Reznor heat has been the most comfortable heat we've ever had. Reznor contributes to worker comfort even during hot weather, because those big powerful fans can be turned on to provide cooling air circulation."

REZNOR
THE WORLD'S LARGEST-SELLING GAS UNIT **HEATERS**

"We found that only gas unit heating offers all these advantages . . ."

- **LOW EQUIPMENT COST**
- **LOW INSTALLATION COSTS**
- **COMPLETE ADAPTABILITY TO FUTURE CONSTRUCTION**
- **LOW OPERATING COSTS**
- **NO MAINTENANCE PROBLEMS**
- **INSTANT RESPONSE TO EVERY CHANGE IN TEMPERATURE**
- **WASTE NO FLOOR SPACE**
- **EXTRA HEAT FOR TROUBLE SPOTS**

For more information mail the coupon at left or call your nearby Reznor distributor. He's listed under "Heaters-Unit" in the yellow pages of your telephone directory.

REZNOR MANUFACTURING COMPANY
174 Union Street, Mercer, Pa.

☐ *Please send me my free catalog on Reznor gas heating equipment.*

☐ *Please have a representative call to discuss our plant heating problems.*

Name.....Title.....

Company.....

Street.....

City.....State.....

The Power Plant Engineer Said: "I WOULDN'T KNOW..."

INQUIRING REPORTER: So you use Nalco System water treatment ... How often are your boilers turbined?

ENGINEER: I wouldn't know—only worked here seven years. *

* You recognize the Engineer's answer as a twist on the old one about *How-often-do-you-get-a-raise-around-here.* Our excuse for bringing it up is that the engineer's answer applies to hundreds of plants using Nalco water treatment. New plants, starting boilers from scratch with Nalco, report years on line, *billions* of pounds of steam generated in boilers that have *never* been turbined ... and probably never will be. Older plants, where turbining was as routine as checking the draft gauges, now open boilers only to show the inspectors.

These Nalco *results* can quite possibly be duplicated in your plant, regardless of the kind or severity of your water treatment problems ... or the size of your operation. Write or phone, now, for a fast start toward permanent water treatment security.

NATIONAL ALUMINATE CORPORATION

6273 West 66th Place • Chicago 38, Illinois

Telephone: POrtsmouth 7-7240

In Canada: Alchem Limited, Burlington, Ontario

THE Nalco® SYSTEM ... Serving Industry through Practical Applied Science

For more facts circle 525 on Reply Card

PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by Marjorie E. Weissman

Television Aids Steel making

CLOSED-CIRCUIT television enables operators at the Weirton Steel Co., Weirton, W. Va., to see and control processing operations inside reheating furnaces 150 ft away.

A second TV installation in the mill provides remote observation and control of steel slabs, 350 ft from the operator, in transit on roller tables from the roughing to finishing departments.

Use of TV in the two separate processes has eliminated the problem of cold edges in slabs due to their overhanging the hearth.

The complete TV installation includes three cameras, each positioned at the side of a reheating furnace. They are connected by closed-circuit to a monitor in the remote-control booth for the furnaces 150 ft away and around a corner from the cameras.

A fourth camera is mounted so that it scans a 350-ft roller table between the roughers and the finishing mills. The camera enables operators in the control booths of both the roughing train and the approach table of the finishing mill to see and make certain that the steel slabs are properly positioned while in transit between the two operations.

In the reheating application, a camera is located at the side of each of three reheating furnaces, a few feet from the exit. Each camera peers through a small hole in the furnace wall, and scanning the hearth at a point where it meets the furnace discharge chute. The three cameras, hooked into an automatic switching unit, are connected by cable to the monitor in the furnace control booth, overlooking the furnace entrances.

Inside view of reheating furnace is provided by this TV camera (arrow)

When a new slab is ready for a given furnace, the operator, using remote controls, opens the entry door. Automatically, the TV camera at the exit end of that furnace is activated and its pictures are switched to the operator's monitor.

Watching the monitor, the operator pushes the heated steel slab at the exit end into the discharge chute, and moves the others forward to make room for the incoming slab. Guided by the TV picture, the operator positions the new slab so that it is at the edge of the hearth, but still in the uniform heating area.

Before installation of the television system, the operator relied on a coworker to signal when the exit slab reached the edge of the hearth. As a result of the time lapse between signal and stoppage, the slab would occasionally move beyond the edge of the hearth. Such slabs will not roll properly in the mill because of "cold" edges or sections.

Because the furnaces heat the slabs to temperatures approaching 2000 F, the cameras must be shielded from the heat. This is done by encasing each camera in a metal box provided with a conditioned air system. In this way, the temperature of the camera is maintained at an efficient working level.

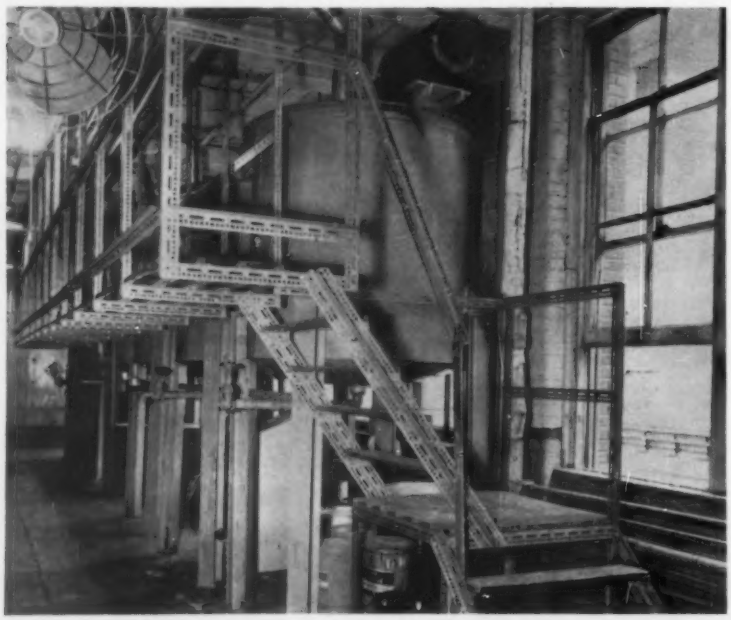
The camera used to scan the roller table also is protected from heat by a special casing. It is mounted on a stand overlooking the 350-ft table and connected by a closed-circuit to monitors in the control booths of the roughing train and the finishing mill. By watching the monitors, the operators at each end are able to see each

"Erector Set" Catwalk Saves Time and Money

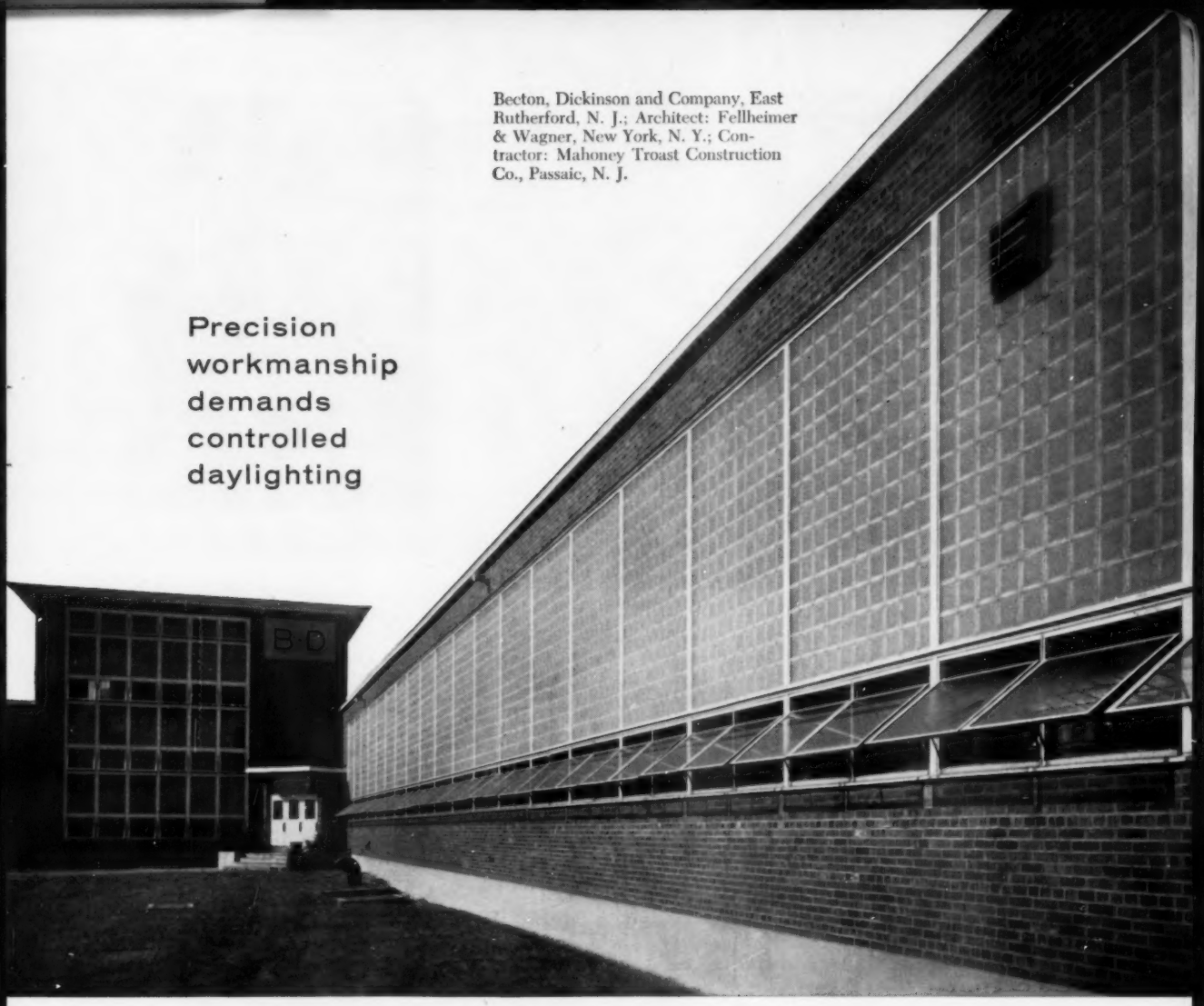
SLOTTED ANGLE framing steel was used to construct a catwalk needed for servicing seven new paint vats installed at the St. Louis plant of the Glidden Co.

A wrench and special cutter were the only tools needed in construction of the catwalk. Time required was 20 hr, giving a saving in labor costs of 50 per cent more than other methods.

The system of slots and holes at 3-in. intervals along the angle steel, made it possible to suspend the catwalk from the ceiling, eliminating the need for uprights fastened to the floor and releasing the floor space for other purposes. *From a release of Acme Steel Company, Chicago, Ill.*



Slotted angle framing steel was used to construct a catwalk for paint vats



Becton, Dickinson and Company, East Rutherford, N. J.; Architect: Fellheimer & Wagner, New York, N. Y.; Contractor: Mahoney Troast Construction Co., Passaic, N. J.

Precision workmanship demands controlled daylighting

Owens-Illinois Glass Block eliminate glare, cut maintenance costs, provide better light all day long...

Owens-Illinois Glass Block won't rust, rot or corrode...are hard to break...almost eliminate maintenance costs . . . permit use of large glass areas without excessive heat loss.

At Becton, Dickinson and Company, good vision is a "must" because B-D thermometers, hypodermic syringes, needles and other physicians' supplies are made to close tolerances and must pass exacting performance tests.

In B-D's new East Rutherford, N. J., plant, panels of Owens-Illinois Glass Block provide a natural solution to lighting problems by directing daylight upward and diffusing it over all parts of the plant all day long. Brightness is kept at comfortable levels, excessive glare and harsh contrasts are eliminated. Room temperatures are easier to regulate because Owens-Illinois Glass Block insulate so efficiently.

Owens-Illinois Glass Block are available in a wide variety of designs from super-clear that you can see through to those that restrict sight completely. If you are in the process of remodeling old structures or building new ones, don't overlook the maintenance economies and better seeing conditions that panels of Owens-Illinois Glass Block can bring to your plant.

For information, write Kimble Glass Company, subsidiary of Owens-Illinois, Dept. PE-8, Toledo 1, Ohio.

OWENS-ILLINOIS GLASS BLOCK
AN (O) PRODUCT

OWENS-ILLINOIS
GENERAL OFFICES · TOLEDO 1, OHIO

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PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

slab as it rolls down the table and to take control procedures if the slabs pile up or fail to roll properly. *From a release of Radio Corporation of America, New York, N. Y.*

Poor Wrenching Abuses Bolts

A BOLT never again has to work as hard as it does during the wrenching up of a rigid joint, when it must provide sufficient clamping force on the joined members, withstand torsional stresses and adjust itself to loading conditions.

To keep a joint tight, residual tension must be set up in the bolt. This is the force left within the elongated bolt after tightening that tends to return it to normal, thus continually clamping the material between bolt and nut. A bolt stays tight as long as residual tension exists.

It is easier to tighten a flexible joint too tight than not tight enough, for the tendency is to tighten a bolt to the limit of the operator's strengh.

A steel bolt will stretch within its elastic limit an amount equal to 0.001 in. per inch of grip length for each 30,000 psi of load. Use of a micrometer will tell how much a bolt has been loaded and when it has been overstressed.

To figure the approximate torque for a bolt, multiply the bolt load in pounds by the diameter in inches by 0.2. For example: a ½-in. commercial bolt can carry a load of 4950 lb. The proper working load for this bolt is 60 per cent of 4950 lb, or 2970 lb. Therefore torque equals 297 in.-lb, or a load of 37 lb pull on an 8-in. wrench. *From a release of Russell, Burdsall & Ward Bolt and Nut Co., Port Chester, N. Y.*

Materials Handling by Tongs

UNTIL A YEAR ago, 3300-lb rolls of paper, received at the Sealright Co., Inc., Fulton, N. J., were unloaded at the truck dock, then pushed down a 50-ft long aisle to an elevator. Three or four rolls at a time were then taken to the basement via the elevator, where they were moved by lift truck to the storage area.

Tongs and hoist make efficient twosome for handling heavy rolls of paper

The elevator in use was 30 years old and in need of replacement or repairs. Instead of replacing or repairing it, a new hoist and tongs installation was made to handle the paper

(Continued on page 40)

Low Temperature Molding Technique for Vacuum Blankets Assures Better Products

MOLDED RUBBER bags or blankets of almost any contour are being made at Quaker Rubber Div. for use in the vacuum molding of reinforced laminates. Previous methods of forming a product in a vacuum mold had not been completely successful due to the high temperatures required usually resulting in damage to the mold.

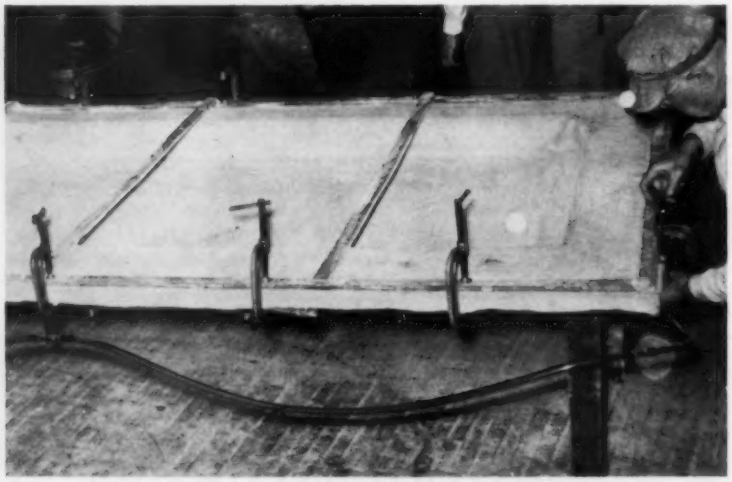
Constructing bags of cured rubber was a tedious and expensive job and sometimes left seams which showed in the final product. In addition, nonuniformity of the product was attributed to excessive stretching in corners and contours.

Using special, high grade rubber, a molding bag is now preformed on the mold by applying vacuum, then curing it on the mold, both operations being carried out at low temperatures.

The new method, cheaper than previous ones, produces a bag which also holds its shape and lasts longer and will withstand temperatures up to 240 or 250 F. In case of a tear, the bag can be repaired by applying a cold patch, similar to that used for repairing inner tubes.

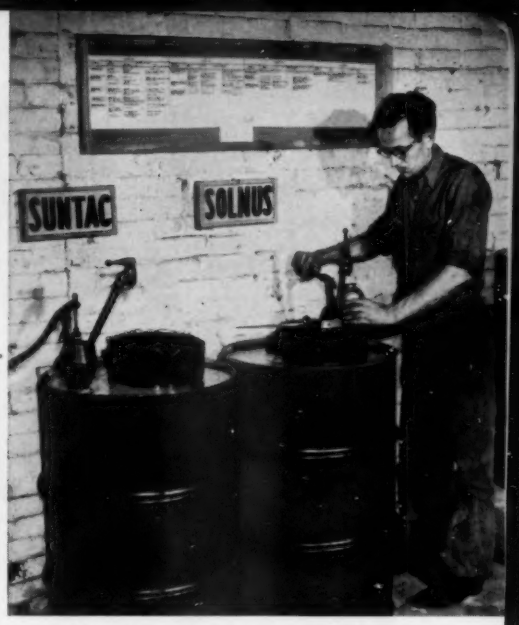
The new process assures a smooth finish on the laminates because the rubber fuses itself into one mass while undergoing curing. *From Porter People, Products and Places, published by H. K. Porter Company, Inc., New York, N. Y.*

Mixing liquid polyester with glass fiber



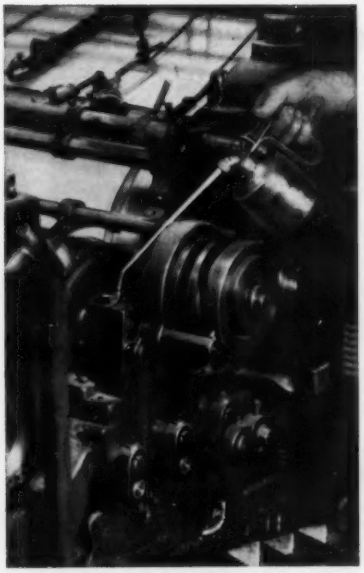
Rubber bag is placed over laminate, vacuum is applied. Reinforced plastic results

Seven Products Replace Twelve. Sun representatives show how Sun's plan of industrial lubrication and preventive maintenance benefit management.



Over 70% of all plant equipment is now lubricated by only two moderately priced oils.

How A Sun Engineer Helped Cut Lubrication Costs by 15%... Reduce Oil Inventory by 42%



Maintenance Is Easier. Sun's plan helps prevent mistakes... reduces chances of applying wrong lubricant.

For years, department foremen of a large folding box plant purchased "special" lubricants to meet individual needs. Throughout the plant, a total of twelve products were being used...some extremely high in price.

The man from Sun called management's attention to this fact. He pointed out that much of the plant equipment, although different in name and function, was mechanically the same. He proved that over 70% of the equipment could be lubricated by two products instead of several lubricants basically alike.

Today, as a result of Sun's recommendations, "special" lubricants are gone; costs of lubrication are down 15%; and, oil inventories are reduced by 42%.

For the full story about how Sun can simplify lubrication setups and save on oil costs...see your Sun representative or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. PY-8.

SUNOCO

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

PHILADELPHIA 3, PA.

IN CANADA: SUN OIL COMPANY, LTD., TORONTO AND MONTREAL

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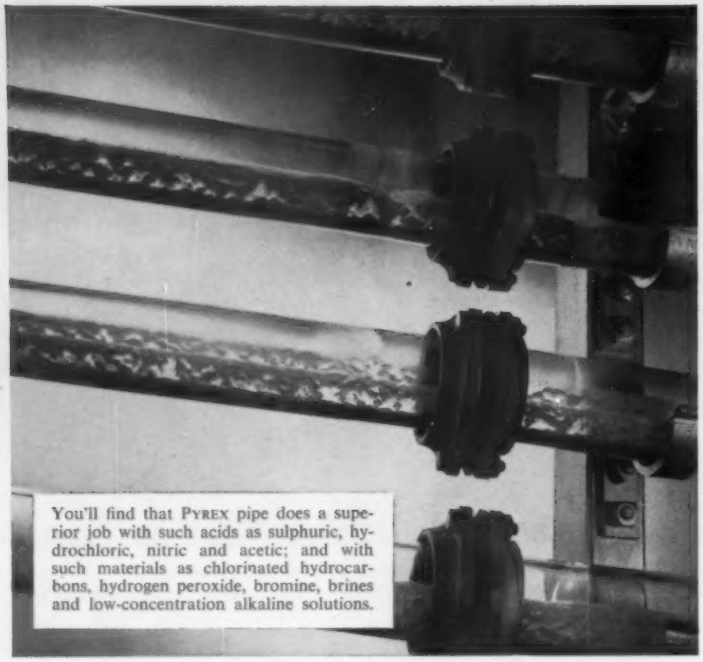

You'll find that PYREX pipe does a superior job with such acids as sulphuric, hydrochloric, nitric and acetic; and with such materials as chlorinated hydrocarbons, hydrogen peroxide, bromine, brines and low-concentration alkaline solutions.

Are you missing the corrosion resistance of PYREX® pipe because you think it will break?

One plant manager describes his experience with PYREX pipe this way: "There was no breakage during installation. There have been no lines broken because of the product handled, the temperatures involved, or the age of the pipe. There has been no accidental breakage. In short—there has been *no breakage*."

Every acid-handling line in this manager's plant has been PYREX pipe since 1943. The company switched to PYREX pipe because acid products quickly corroded metal lines.

Corrosion in the metal lines also made cleaning difficult. Frequent replacements made maintenance very costly.

Engineers and operating men in hundreds of processing plants make similar "no breakage" reports about millions of feet of PYREX brand glass piping in use today. If you are not enjoying the trouble-free corrosion resistance of PYREX pipe because you are worried about breakage, why not talk to people who use it daily. We shall be glad to furnish names.

Now even more durable

All PYREX pipe ends and fittings (except U-bends) are now tempered, which makes them much stronger than annealed fittings. They're strong enough to drive nails.

Cuts maintenance problems

The liquid-smooth surface of PYREX pipe does not pit. It stays clean longer. Cleaning, when necessary, is easy, for you see the interior of the pipe at all times. Maintenance is practically nil.

What does it cost?

PYREX pipe's initial cost is lower than most other corrosion resistant piping. Installation cost is low—even lower when your own men do it—and so is maintenance. Service is long.

More information for you

Let us send you informative bulletins. Circle the reader inquiry form at the back of this publication. Or, write direct to The Plant Equipment Sales Dept., Corning Glass Works, Corning, New York.

CORNING GLASS WORKS
10-8 Crystal Street, Corning, New York
Corning means research in Glass

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PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

rolls. The result has been lowered labor costs and better materials handling.

For the installation, an opening, measuring 5 ft 7 in. by 8 ft was cut in the floor just inside the doors of the loading dock. An overhead rail was positioned above this opening, extending over the loading dock. A two-ton Yale hoist, remotely controlled by a Louden Motoveyor, was mounted on this rail to raise and lower the tongs.

The tongs are similar to those used by the steel industry to lift coils of strip steel, the curved jaws fitting around the circumference of a roll of paper 40 to 50 in. diam. An automatic locking mechanism controls the opening and closing of the tong jaws.

This combination of tongs and hoist is also useful for unloading rolls of paper from an open top truck. The rolls are lifted out of the truck with the tongs and, with the guidance of one man are moved into the building and lowered through the hatchway to the basement. When closed top trucks are used for delivery of the paper, the paper is first rolled onto the dock where it is then picked up.

In addition to handling the large paper rolls, the tongs and hoist are used for moving palletized cartons of wax and other bulky goods in the basement. *From a release of Heppenstall Co., Pittsburgh, Pa.*

Compressing Metal Honeycomb

METAL honeycomb core used in aircraft must be trimmed to suit airfoil

Special table and clamping device make fast job of compressing honeycomb

shapes and compressed to achieve required strength.

A work table and clamping device, developed in our plant, does this job more accurately and 50 per cent

"They made me a V.P. for specifying

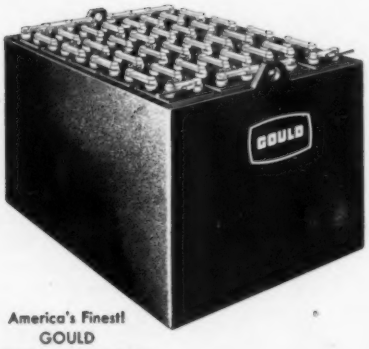
GOULD

Research-built

BATTERY POWER"

A healthy reward awaits *anyone* who chooses Gould battery power. Not only is battery power the most economical power you can buy, but Gould power gives you extra performance and extended service life possible only through years of basic and applied battery research.

Another reason for specifying Gould is Gould's Field Engineering Service. Covering all industrial centers in the nation, it's the finest in the industry . . . helps keep your batteries working at top capacity . . . adds months to their normal life. Get more power per dollar with Gould research-built battery power!



America's Finest!
GOULD
Industrial Truck Batteries

Always Use Gould-National Automobile and Truck Batteries

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Trenton 7, N. J.

"BETTER BATTERIES THROUGH RESEARCH"

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HERE'S WHY

DYNAPRENE®
Flexible Cord

COSTS YOU LESS...

DYNAPRENE Flexible Cord is built to last under the most rugged shop conditions. Lower priced cord can be bought, but **DYNAPRENE** lasts so much longer that there are fewer replacements, a minimum of down time for tools and less labor lost . . . all of which adds up to economy.

HERE'S HOW DYNAPRENE IS BUILT

DYNAPRENE has flexible stranded copper conductors; separator over conductor to protect the insulation from corrosive effects of copper; high dielectric-strength rubber insulation; fillers for strength and roundness; textile covering for firmness and reinforcement; extra tough, long lasting, tire-tread type neoprene jacket with oil and sunlight resistance to withstand the most rugged working conditions. **DYNAPRENE** Flexible Cord is available in Underwriters' type SO, SJO and SV-neoprene jacketed.

For long life and true economy be sure you get **DYNAPRENE** Flexible Cord.

WELL BUILT WIRES SINCE 1899

WHITNEY BLAKE COMPANY

NEW HAVEN 14, CONNECTICUT

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PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

faster than previous methods used. Manually operated, the table has an adjustable track running alongside. To compress the core to specifications, the core is placed on the table, measured and clamped. The roller is then adjusted and pushed along the track. *From a release of Glenn L. Martin Co., Baltimore, Md.*

Easy Bottle Inspection

Television magnification screen is aid in detecting flaws in bottles at Britvic Ltd. fruit juice bottling plant, England. (From Target, London, England)

Seamless Concrete Pipe

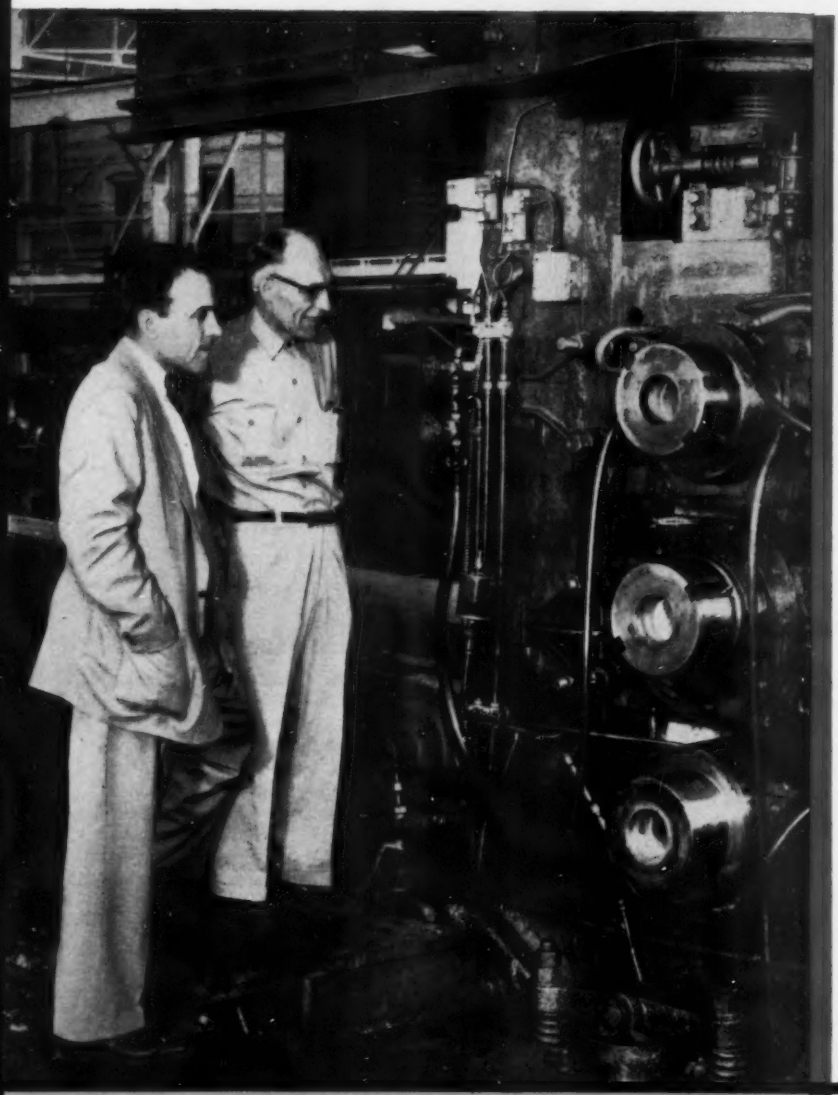
More than 300,000 ft of concrete pipe have been laid by a mobile manufacturing plant that pulls itself through the earth, laying a continuous, jointless, seamless pipe in its wake.

The machine is lowered into a trench, the lower half of which is shaped to the exact O.D. of the pipe, along which it pulls itself by means of a gasoline-powered winch-line anchored to a "dead man." A transit mix truck places two- and three-inch slump concrete into the hopper of the machine. Then, an electric tamper tamps the mortar around the aluminum slip-forms which are fed into the moving machine where electrical vibrators compact the concrete. The forms mold the upper two-thirds of the pipe, the lower portion of which is formed by the trench bottom.

The pipe fits snugly against each side of the trench, thus gaining lateral support. The trench bed is also fitted exactly to the pipe and lends it strength. As soon as the pipe is squeezed out of the machine, a six-inch temporary fill is laid over it, providing good curing conditions.

In tests, a length of pipe, four feet

Sick slab roll recovers fast with application of STANOGEAR *Compound*



Eugene Ewald (right), Mill Foreman, and Marshall Fox, Standard Oil lubrication specialist, inspect slab roll. STANOGEAR Compound helped solve lubrication problem on roll neck bearings.

Marshall Fox who proposed switch to STANOGEAR with resultant improved operation, is experienced in providing such technical service. Marsh has a Mechanical Engineering degree from Purdue to qualify him for this work. In addition, he has completed Standard's course for sales engineers. This experience and training, customers find, pay off for them.

A slab roll at Matthiessen & Hegeler Zinc Company, La Salle, Illinois, was sick. It suffered from repeated roll neck bearing failures. Bearing temperatures couldn't be controlled. A consultant was summoned—Marshall J. Fox, Standard Oil lubrication specialist. His diagnosis and remedy: Install STANOGEAR Compound and equip the machine with a central pressure system for application. Recommendations were followed. Result: No bearing failures, due to faulty lubrication, since. Maintenance costs reduced. Time lost through breakdowns slashed.

This was a condition made to order for STANOGEAR to remedy. And Matthiessen & Hegeler knew there was a man at hand who could suggest what should be done. It's another demonstration of what this unbeatable combination can do when put to work:

1 **Standard Oil lubrication specialists capable of giving technical help.**

2 **Top quality products *that deliver results required.***

STANOGEAR Compounds contain special additives making them suitable for applications where heavy loads cause welding, seizure or scoring.

In the Midwest and Rocky Mountain states, a Standard Oil lubrication specialist in your nearby Standard Oil office will gladly give you more information about STANOGEAR. Call him. Or contact Standard Oil Company, 910 So. Michigan Avenue, Chicago 80, Ill.

STANDARD

STANDARD OIL COMPANY

(Indiana)

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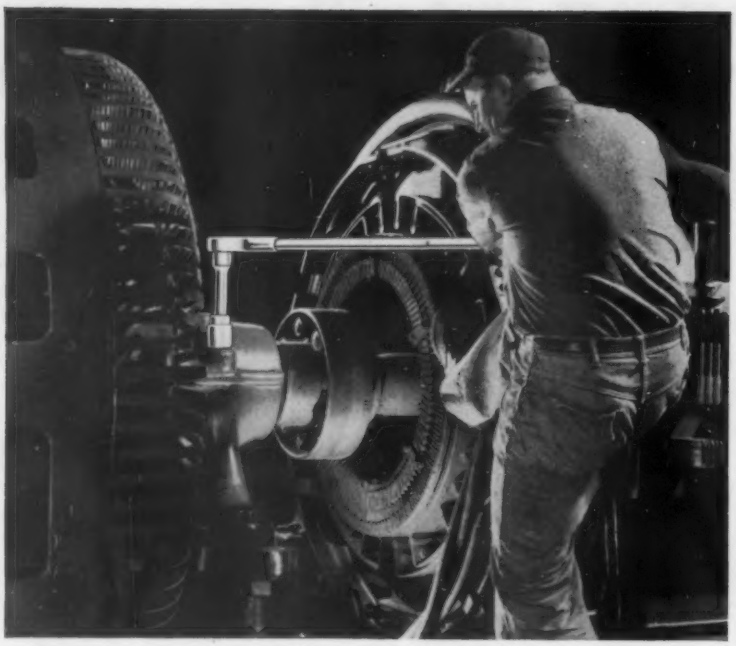

*Snap-on Tools
grip safe – grip sure

Upside down, sideways — whatever the angle — a man can put everything he's got on a *Snap-on* wrench, and do it with confidence. When a *Snap-on* socket fits over a nut — it really fits. Sockets are hot-broached providing smooth walls and corners that are free from tears and cracks. They're heat-treated all the way through for toughness on the inside as well as the outside. These, and many other developments, give *Snap-on* tools that extra measure of strength, long life and smooth fit. They'll cut your tool costs — and your downtime.

If you have a problem involving special tool design or application or any other question on tools, talk it over with your *Snap-on* man. He is a specialist who devotes all of his time to industrial application of *Snap-on* tools. Write us or call your nearest *Snap-on* branch. Free catalog of industrial wrenches and hand tools is yours for the asking.

No. 521-EHD-B set of EXTRA HEAVY-DUTY *Snap-on* Loxocket Wrenches — 21 tools in all.

*Snap-on is the trademark of Snap-on Tools Corporation.

SNAP-ON TOOLS CORPORATION
8068H 28th Avenue
Kenosha, Wisconsin

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PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

long and 30 in. in diam sustained a load of 43,000 lb without visible cracking or failure. In hydrostatic tests, the 30-in. diam pipe handled a head of 74.4 ft without rupture.

Pipe can be laid in 24, 30, 36, 42, 48 and 60 in. diam by this type of machine, which is designed by the No-Joint Concrete Pipe Company, Yuba City, Calif., and built by California Blow-Pipe Company of Escalon, Calif. *From This Earth, published by Permanente Cement Co., Oakland, Calif.*

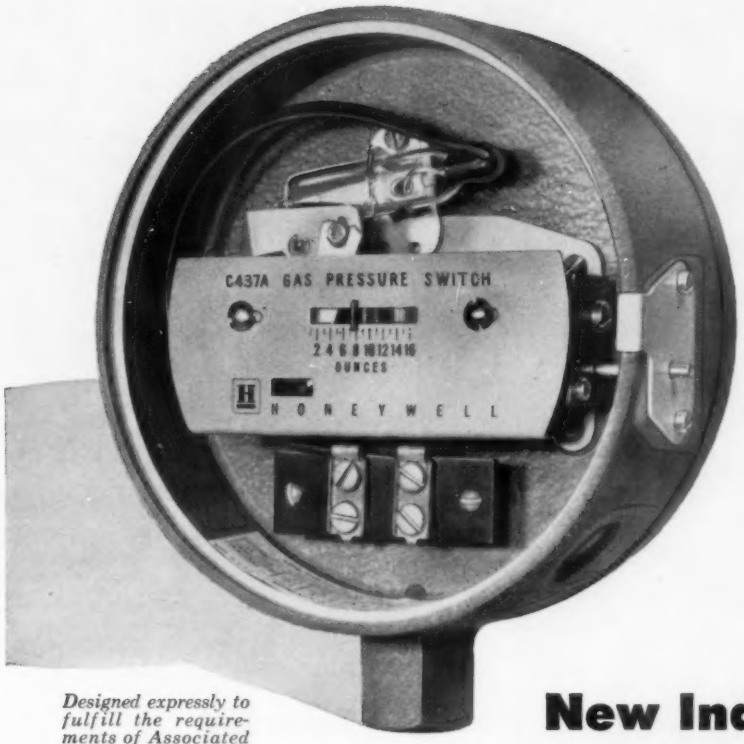
Machine "pulls" itself along trench, squeezing out seamless concrete pipe

Drainage Tile Clips

SOIL AND STONES can be prevented from working their way into sewage disposal systems by replacing conventional wrapping around field tiles with joint-covering, molded polyethylene clips.

For dispersal or collection of liquids, tiles should be placed ⅜-in. apart with the top of the joints covered. If the spacing is less than ⅜-in., there is possibility of inefficient operation and tile breakage when tiles expand with the absorption of water. If the spacing is too great, there is increased possibility of infiltration by soil and stones which may clog the system.

Lugs molded inside the plastic clips provide the proper spacing and absorb linear expansion without damage to the tiles. The clips are long enough and wide enough to cover the top and sides of the tiles, while the bottom remains open for dispersal or collection of liquids. A fin molded into the top serves as a handle for snapping the



Designed expressly to fulfill the requirements of Associated Factory Mutual and Underwriters' Laboratories.

New Industrial Gas Pressure Switch offers 4 exclusive safety features

USE this new Honeywell C437A Industrial Pressure Switch as a safety cutoff on multiple burner gas installations . . . as a pressure controller for hazardous gases . . . or as a differential controller for air or non-hazardous gases. It's simply designed, yet provides complete protection.

The C437A Industrial Gas Pressure Switch has these exclusive safety features:

1. Sealed Pressure Chamber—Should the diaphragm rupture from over pressure or any other cause, gas can't escape into the switch compartment or to the atmosphere. The pressure chamber is fitted with a pipe tap to permit venting to the stack.

2. Protected Settings—All adjustments are inside the case for protection against careless or accidental manipulation. A metal plate on the side of the case must be removed before changes in adjustment can be made.

3. Ever-Visible Switch Position and Control Settings—The entire cover of the pressure switch is a window. Position of the mercury switch and adjustment of the control settings can be determined at a glance.

4. Lockout Mechanism—An optional safety feature, when manual resetting is desired. The lockout mechanism prevents the switch from remaking contact after pressure has once dropped below the setpoint . . . even though pressure returns to normal. The lockout release button is the only adjustment that can be manipulated without removal of the protecting metal plate.

For complete information, call the nearest Honeywell office. A Honeywell sales engineer is as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.—in Canada, Toronto 17, Ontario.

● **REFERENCE DATA:**

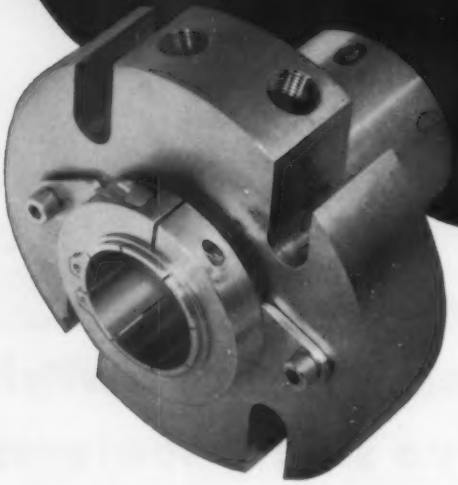
Send for Specification S1011-1 Honeywell Gas Pressure Switch C437A

MINNEAPOLIS **Honeywell**
BROWN INSTRUMENTS
First in Controls

For more facts circle 533 on Reply Card

NEWEST OF THE GARLOCK 2,000

GOODBYE
TO PUMP SEAL
MAINTENANCE



Imagine! You just install the new Unitary Mechanipak Seal and forget it! No shutdowns for maintenance. It's completely self-contained . . . comes to you ready to install . . . no on-the-job adjustments needed. And, it's leakproof . . . sealing faces are precisely lapped and pressure balanced on high pressure models.

The remarkable Mechanipak is only one of the famous GARLOCK 2,000 . . . two thousand different styles of packings, gaskets, and seals to meet *all* your needs . . . The *only* complete line available. That's why you get *unbiased* recommendations from your Garlock representative. Call him today or write for Mechanipak Catalog AD 151.

THE GARLOCK PACKING COMPANY,
Palmyra, New York

For Prompt Service, contact one of the 30 sales offices and warehouses throughout the U.S. and Canada.

GARLOCK

Packings, Gaskets, Oil Seals, Mechanical Seals, Rubber Expansion Joints

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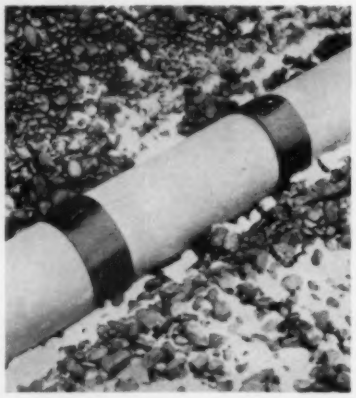
PLANT ENGINEERS' DIGEST

(Digest begins on page 36)



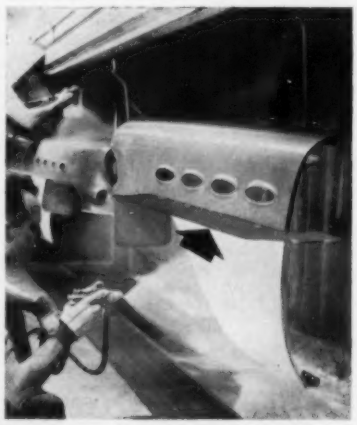
Plastic clips on tile help prevent soil working into sewage disposal system

tile clip in place and as a guide for proper alignment. *From a release of Bakelite Co., Div. of Union Carbide and Carbon Corp., New York, N. Y.*

Painting Shield

PAINTING front fenders for automobiles one color on top, another color on the lower part, without sending them through the spray line twice, is done by using a shield made in our shop.

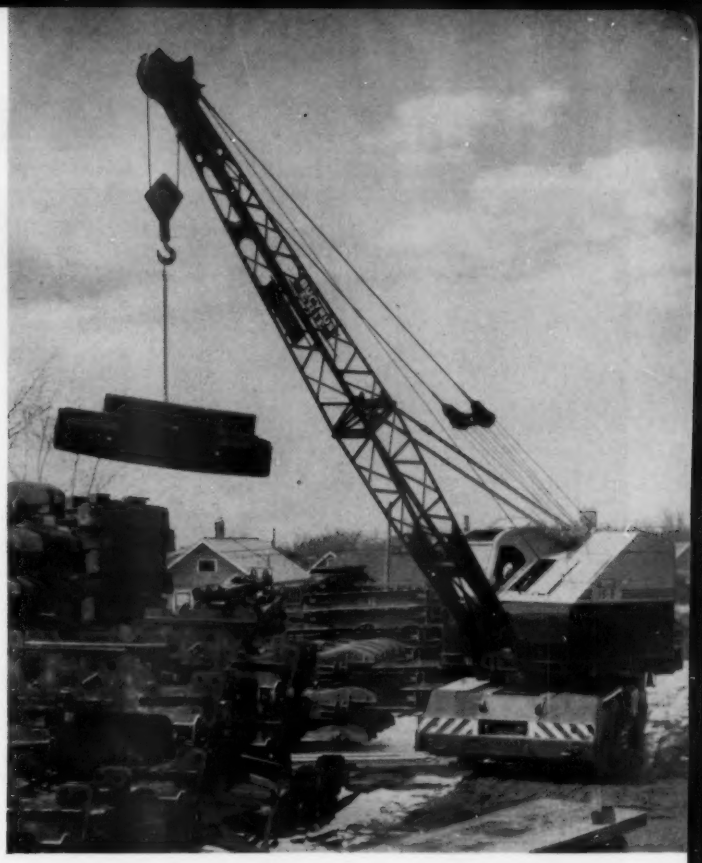
The shield, six inches wide and the length of the fender behind the wheel cutout, fits snugly along the side of the fender, projecting at right angles. It is held in place by its own weight, suspended from tiny hooks which fit into the holes where the fender trim is later bolted. Use of the shield prevents splashing and overlapping. *From a release of Buick Motor Div., General Motors Corp., Flint, Mich.*



Shop-made shield (arrow) enables two painters to spray two-color fender

For more facts circle 535 on Reply Card

PENDANT-TYPE BOOM SUSPENSION with 8 parts of operating line between bridle and "A" frame is ideal for changing boom lengths conveniently. *Safety Boom Stops* of telescoping pipe type are furnished on machines equipped for lifting-crane service.



OPEN THROAT BOOM carries two boom point sheaves for reeving up to four parts of line. Special boom point equipment for 5- or 6-part rigging is available. Standard booms are 30 feet (15-B) and 35 feet (22-B). They may be lengthened by 5-ft., 10-ft., or 20-ft. inserts.

EXTENDIBLE OUTRIGGERS — I-beam, manually-controlled outriggers, two on each side of carrier chassis, provide added stability for swinging capacity loads. Jackscrew-type outriggers are available at extra cost.

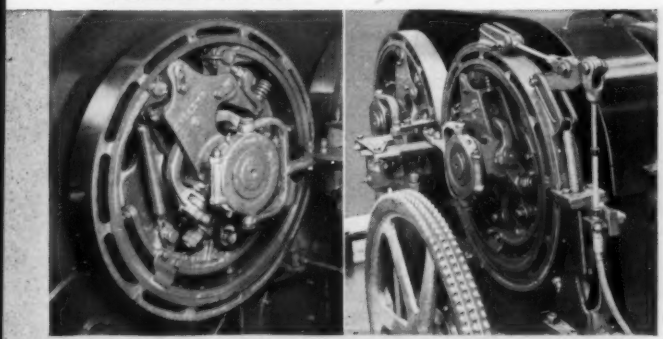
How BUCYRUS ERIE Transit Cranes Cut Handling Costs

Bucyrus-Erie Transit Cranes, combining heavy-duty lifting capacity with rubber-tired mobility, are ideally suited to a variety of handling jobs. They cut your handling costs from the start because so many features that are "extras" at additional cost on other cranes are furnished as standard equipment on Bucyrus-Erie machines. Check the advantages pictured here — see what they can mean to your men in the yard.

In addition, Transit Cranes have *power controlled lowering* for the main hoist line on lifting cranes to permit delicate positioning of loads, and *power controlled boom hoist,* fully independent of all other functions, to provide high-accuracy boom control in crane work.

For more information on these and other Transit Crane features, see your nearby Bucyrus-Erie distributor soon for complete details — two models available — the 15-ton 15-B, and the 25-ton 22-B.

254E56C



FOUR MAIN OPERATING CLUTCHES are alike, with normal replacement parts interchangeable. Friction bands are reversible end for end. A floating link at the dead end of each clutch band (except one special clutch used for power controlled load lowering) materially increases the effective contact area between the clutch band and housing, reducing hand lever loads and increasing the load capacity of the clutch.

FRICTION SWING BRAKE, in addition to regular swing lock, enables operator to spot and hold the boom point over a desired position. Ratchet squeeze lock holds brake "on" without operating holding lever.

BUCYRUS-ERIE COMPANY

South Milwaukee, Wisconsin

MICRO precision switches

...THEIR USE IS A PRINCIPLE OF GOOD DESIGN

MICRO SWITCH Trip Control installation. Each operator must operate two switches before press will work

MICRO SWITCH Trip Control speeds production, provides safety to operator and equipment

Whether a press is operated by one, two, three or four or more operators, MICRO SWITCH Trip Controls make sure it cannot operate until every man is at his safety station.

Increased production comes from:

- Instant electrical response
- Feather-touch operation
- Easy control changes
- Decreased operator fatigue

Increased safety comes from:

- Two-hand operation
- Cannot be "cheated"
- Inoperable if any component fails
- Interlock prevents power stroke while changing dies.

New machines may be made safer and more versatile by the use of MICRO SWITCH Trip Controls. Old equipment may be electrified and modernized to bring productivity up to today's requirements.

A Trip Control installation consists of only one compact control box, two hand switches per operator, one foot switch per operator (if desired), lock-out switches (if desired) and clutch-actuating equipment if machine is not power-clutch actuated.

Hand switches have snap-action contacts, which require only short, easy actuation. Both must be operated within a set time interval. The compact control box is easy to mount. A lock on the cover permits only authorized personnel to make control changes. A hinged, dead-front panel inside isolates all current-carrying components.

MICRO SWITCH Trip Controls have wide range of uses

These controls offer a choice of desirable single-stroke control for positive mechanical clutch machines and automatic cycling control for friction clutches and hydraulic and pneumatic equipment.

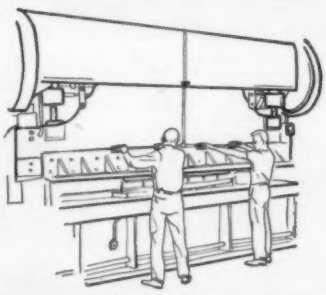
FOR SMALL PRESSES

Provides fast, safe, effortless operation of small two-hand presses, riveting machines, etc.

ONE HAND—IF NECESSARY

Where one hand is required to hold stock in a protected or enclosed die, control is quickly converted to one-hand operation.

FOR USE ON LARGE PRESSES



Makes operation of large presses safe and less tiring. Any number of operator stations may be "wired into" the control circuit.

SEND FOR CATALOG 65 TODAY

Gives complete description of all controls and clutch actuating equipment.

Let us send you complete information on MICRO SWITCH *Trip Control and the name of the distributor nearest you.*

MICRO SWITCH

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

In Canada, Leaside, Toronto 17, Ontario • FREEPORT, ILLINOIS

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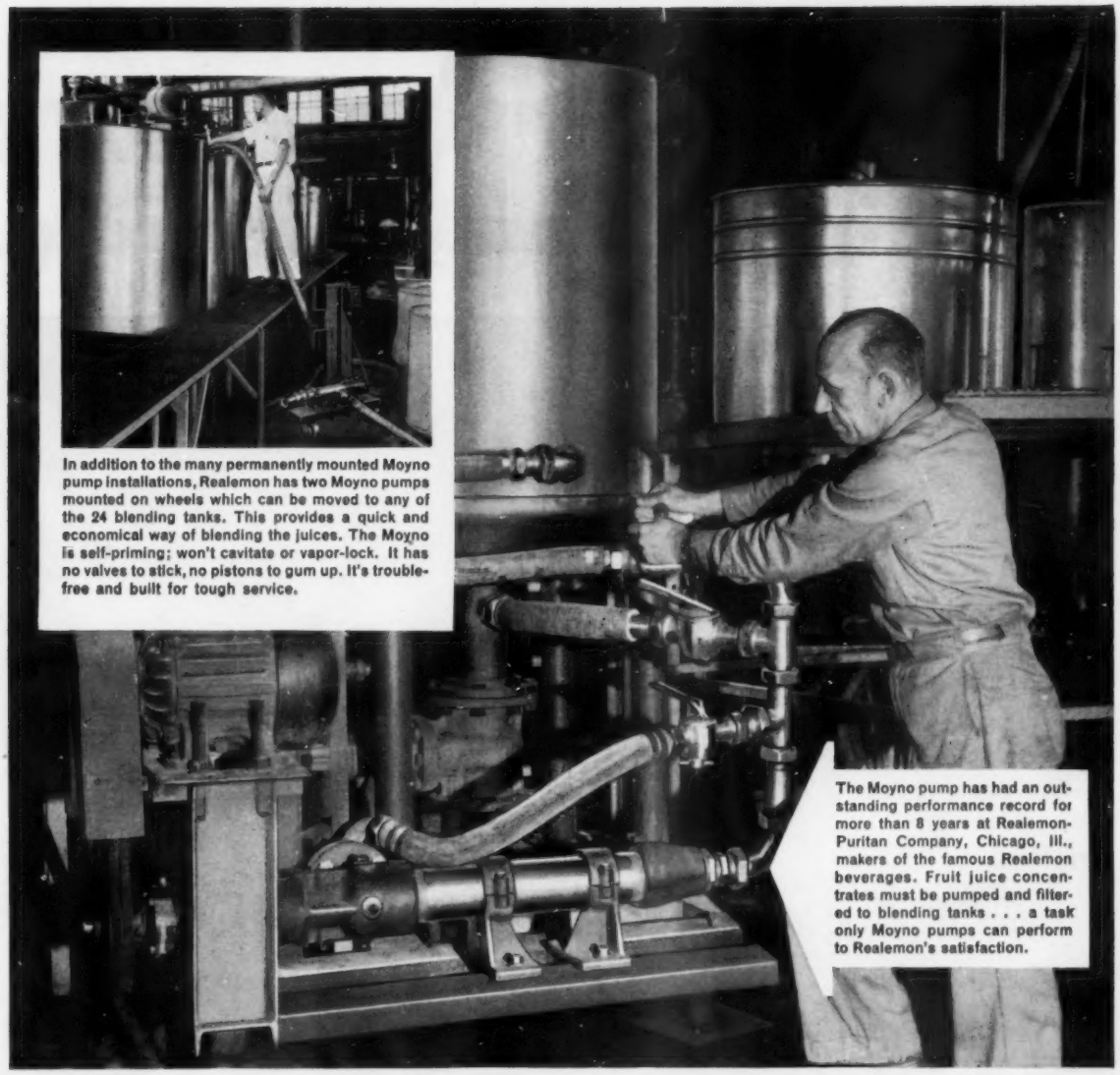


In addition to the many permanently mounted Moyno pump installations, Realemon has two Moyno pumps mounted on wheels which can be moved to any of the 24 blending tanks. This provides a quick and economical way of blending the juices. The Moyno is self-priming; won't cavitate or vapor-lock. It has no valves to stick, no pistons to gum up. It's trouble-free and built for tough service.

The Moyno pump has had an outstanding performance record for more than 8 years at Realemon-Puritan Company, Chicago, Ill., makers of the famous Realemon beverages. Fruit juice concentrates must be pumped and filtered to blending tanks . . . a task only Moyno pumps can perform to Realemon's satisfaction.

Moyno® Pump exclusive choice of Realemon engineers for pumping juice concentrates

In the preparation of many of the famous Realemon products, concentrated fruit juices often must be pumped and filtered to blending tanks.

Pumps formerly used to handle this exacting process wore out completely in a few months because of their inability to stand up under the high acids in citrus juice concentrates.

Realemon then changed to the Moyno pump. Its unique rotor and stator arrangement forms sealed progressing cavities that move the material and provide positive displacement. For this Realemon application, Moynos with chrome-plated rotors and synthetic rubber stators were selected, to assure trouble-free service and long pump life.

Moyno pumps have now been in operation at Realemon for more than eight years, with an outstanding performance record. The only maintenance required is simply to replace the rotor and stator about once a year.

Moynos regularly handle a wide variety of products that other types of pumps can't handle—products such as potato salad, chow mein, fruit, alkalis, pastes, paints, tar —even cement and plaster.

Perhaps the Moyno will solve your pumping problems, too. Write us today for complete information. Ask for a free copy of Bulletin 30-PE

ROBBINS & MYERS, INC.

MOYNO PUMP DIVISION

Springfield, Ohio
Brantford, Ontario

For more facts circle 537 on Reply Card

OFF CENTER WEIGHT--

didn't damage bearings

---RUN AT FULL SPEED-
in this R&M motor!

They're still in perfect condition because they're ***extra large***

No motor bearing was ever submitted to a tougher test! We mounted a five-pound weight—2 inches off-center—on the shaft of a standard R & M "All-Weather" Motor, then turned on the switch. As you can imagine, that motor practically turned handsprings with over 1,000 pounds of centrifugal force being placed on the bearings. It must be recognized also that this is all side-strain on the bearings. After twelve solid hours of this punishment, the R & M bearings were found to be in perfect condition!

Here's a dramatic example that shows how extra-large, fully sealed R & M bearings pay off in rugged service. By "extra large" we mean bigger diameter than you usually find in a motor bearing . . . double-row race width . . . bigger balls that withstand greater load.

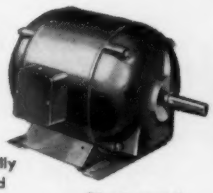
You'd never treat a motor this way, of course. But, *in terms of years of service*, a bearing with stamina like this is a bearing you can *forget*. We build oversize bearings into all R & M "All-Weather" Motors—*at no extra cost to you*—as just one more precaution against any chance of failure later on.

From ***1*** *to* ***200*** *Horsepower . . .*

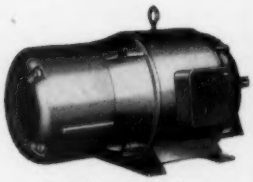
if it's an R & M, it's the Right Motor!

Frequency converters and alternators, 2½ to 15 kw.

Explosion-proof totally enclosed fan-cooled 1 to 40 hp.



Direct current motors 1 to 7½ hp.



Capacitor single-phase motors 1 to 15 hp.

ROBBINS & MYERS, INC.

SPRINGFIELD 99, OHIO • BRANTFORD, ONTARIO

Mail the coupon today—for more information on the finest motor your money can buy!

Robbins & Myers, Inc.
Springfield, Ohio

PE

Please send illustrated Integral Horsepower Motor Catalog, showing all the extra features of R & M "All-Weather" Motors that are furnished at a standard motor price. We are also interested in:

- ☐ Explosion-Proof Motors
- ☐ Totally Enclosed Fan-Cooled Motors
- ☐ Capacitor Single-Phase Motors
- ☐ Frequency Converters & Alternators

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*City*_____ *Zone*_____ *State*_____

"All-Weather" is an R & M trademark

For more facts circle 538 on Reply Card

OPERATION AND PRODUCTION pointers for the industrial plant engineer

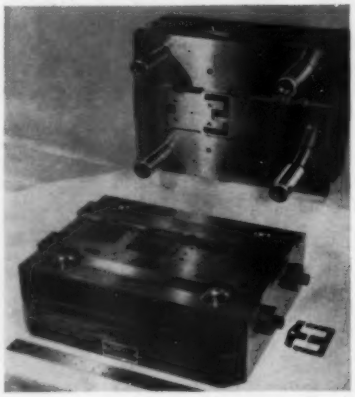
Edited by H. E. B. Anderson

Carbide Dies for Stamping

UNTIL THE COMPARATIVELY recent advent of carbide dies at the Beaver, Pa., plant of Westinghouse Electric Corp., it was necessary to make dies of high carbon, high chrome or high-speed steel. While they gave a satisfactory performance, many dies for the same part were required to maintain production schedules while a die was out of production for sharpening. This sharpening was often enough to require as many as four to six dies for the same part.

To establish tungsten carbide as a proven die material, Westinghouse consulted with Oberg Manufacturing Co., Tarentum, Pa., designers and builders of tungsten carbide dies, and it was decided to apply the material to a wear problem involving a relatively simple shape.

One of the first parts examined was a special E and I type lamination stamped from high content silicon steel for use as magnet and armatures in a contacter frame. The high abrasiveness of this material and the assembly requirement of practically no detectable burr were conditions which could not be met without an inventory of many duplicate tool steel dies to keep press down-time to a reasonable level.



Tungsten carbide die assembly, with E and I laminations produced (right)

A progressive die designed and built for this operation, although costing three times as much as a tool steel die, now turns out more than 18 times as many laminations between sharpenings. The practice at Westinghouse is to sharpen the die at the end of 500,000 strokes, although the die has run one million strokes without producing a part rejected for excessive burr.

Computer for Lathe Setup

WITH NEW STANDARDS furnished by a Carboloy machinability computer, operators in the Chicago plant of Scully-Jones & Co., are machining a part that formerly required 244 minutes machine time in 166.20 minutes—a saving of about 17 hr on 13 parts. This is one of many benefits that

(Continued on page 54)

Handling, Testing and Application Contribute to Safety With Chains

Contributed by H. F. Reid, Jr., The McKay Company

DESPITE THE critical nature of the use of chain and chain assemblies in many modern industrial applications, chains all too frequently are neglected, overloaded, and generally mishandled. The first important consideration in the safe handling of chain is the realization that size alone is not a true measure of the safe working load. Industrial chains are produced from a variety of types of material, each type with specific advantages and limitations. Of the five common grades of "proof tested" chain, only alloy and wrought iron chains are recommended by the National Safety Council for hazardous overhead lifting.

Each foot of these grades of chain is tested, under direct tension loads, prior to final inspection and shipment. For iron chain, this proof load is 10 to 15 per cent higher than the recommended working load limit. For other grades, the proof load is equal to at least twice the working load limit.

The importance of proper rigging and its effect on the safe use of sling chains cannot be over-emphasized, since the safe working load capacity of a sling decreases sharply as the angle between the chain and the object decreases. This effect is shown in Fig. 1.

Chain Size, Inches	Single Sling at 90° Angle	Double Sling at 60° Angle	Double Sling at 45° Angle	Double Sling at 30° Angle	Double Sling at 10° Angle
1/4	3,250	5,650	4,550	3,250	1,100
3/8	6,600	11,400	9,300	6,600	2,300
1/2	11,250	19,500	15,900	11,250	3,900
5/8	16,500	28,500	23,300	16,500	5,700
3/4	23,000	39,800	32,500	23,000	8,000
7/8	28,750	49,800	40,600	28,750	10,000
1	38,750	67,000	54,800	38,750	13,400

Fig. 1. As angle between sling and load decreases, carrying capacity decreases

Complete specifications of this type have been prepared by various chain manufacturers for in-plant use, and generally may be obtained from the manufacturer at no cost.

The ten commandments of chain safety, as outlined by McKay Co. engineers, are these:

1. Do clean chain regularly.
2. Do inspect periodically.
3. Do minimize incidental damage by storing correctly.
4. Do repair safely (return alloy chains to manufacturer for reconditioning).
5. Do pad sharp corners and edges.
6. Do anneal wrought iron chains periodically.
7. Don't anneal high carbon or alloy steel chain.
8. Don't jerk or shock load.
9. Don't twist or kink.
10. Don't exceed manufacturer's safe working load recommendations.

NEW Black & Decker® Heavy-Duty Jig Saw is—

POWER-BUILT

FOR YOUR TOUGHEST JOBS!

We don't buy motors—we build them!

The *heart* of your electric tool is the motor—completely built by Black & Decker! All the power you need and then some—because each motor is built for a specific tool and the job it must do. Black & Decker motors always *stand up!*

Cuts any angle up to 45°...on either side!

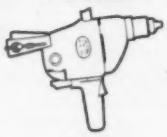
Rugged, versatile, highly accurate—cuts intricate patterns with precision!

Runs cool, offers smooth performance in wood—even 2x4's—and metal. Perfect balance reduces operator fatigue. Offers a full 1″ stroke. Heavy-duty shoe will not wobble or distort under pressure. Armature and gear shafts mounted on ball bearings. Full line of wood and metal cutting blades available. This B&D Heavy-Duty Jig Saw is priced lower than any comparable tool of similar capacity, in its field.

Call your B&D distributor or write to: THE BLACK & DECKER MFG. CO., Dept. 1508, Towson 4, Maryland.

SAWS

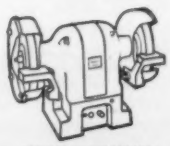
HAMMERS



DRILLS

SANDERS

VACUUM CLEANER



BENCH GRINDERS

Service . . . one of 42 Black & Decker factory service branches is located "next door" to you to give fast, efficient service and genuine replacement parts.

Look in the Yellow Pages under "TOOLS-ELECTRIC"

B&D Black & Decker®

PORTABLE ELECTRIC TOOLS

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OPERATION—PRODUCTION

(O and P begins on page 52)

Photo: Metallurgical Products Dept., G.E.
Standards engineer uses machinability computer to set up job on turret lathe

the company is deriving from using the machinability computer to short-cut time-consuming procedures in setting up machining standards.

Because of the variety of work handled, output rather than tool life is more essential in the Scully-Jones plant. In the past, the procedure of setting up standards on a new job was based on records of past experience or on operator experience. However, in spite of records, it was difficult to pin down standards among machinists, since no final authority could be consulted where one man's experience was as good as another's.

Several months' use of a Carboloy machinability computer changed the situation. It has made operators more aware of the variables in machining practice, and as a result, fewer details are overlooked in setting up a new job.

As an added benefit, the instrument provides the plant with more flexibility in the use of its machines. For example, the job mentioned above, because of structure requirements, calls for machining expanding shells from a solid upset forging.

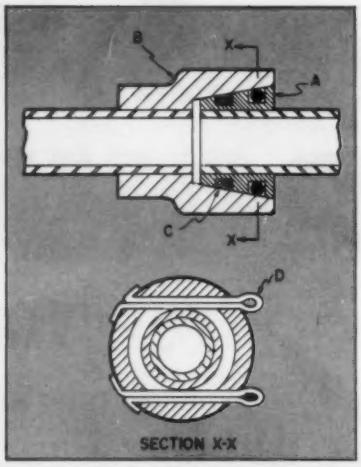
The job was of necessity assigned to a ram type turret lathe not ideally suited to the operation, but use of the computer quickly determined the optimum speeds and feed possible on the machine. After compensating for such job conditions as rigidity, etc., the final standard was quickly determined. Feeds and speeds of the cutting tools were also handled by the computer.

Threadless Pipe Coupling

Contributed by F. E. Riley

A THREADLESS pipe coupling has proved to be very efficient in setups subjected to intense vibration, in systems using pipe up to ½-in. bore, and at fluid pressures up to 100 psi.

The male member of the coupling, A in the accompanying drawing, is a tapered plug that is brazed or otherwise secured to the pipe. The female member, B, has a corresponding internal taper. The male and female tapers need not fit perfectly and surface finish need not be very fine.



Sectional views of threadless pipe coupling. Ring C is sealing medium

A pair of peripheral grooves is machined in the male member and one is fitted with a neoprene 0-ring, C. These 0-rings are annular rings of circular cross-section which when compressed give an excellent fluid-tight seal, capable of withstanding high pressure. The action of engaging the two tapers compresses the rubber ring into the groove and also forces it firmly against the internal wall of the female member.

(Continued on page 56)

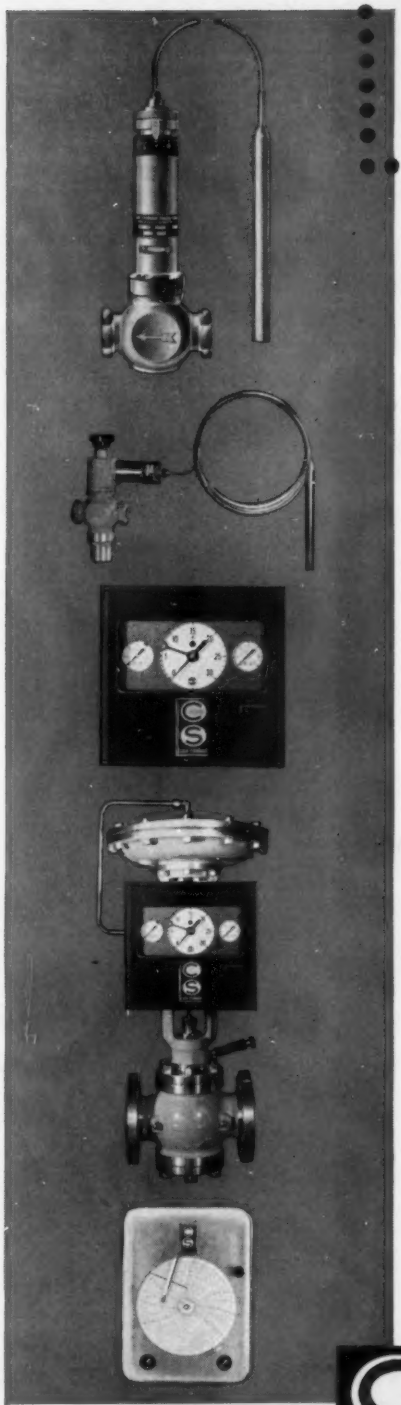
Safe Drivers Get "Gold Star" Awards for Safety in Fork Truck Operation

IN ITS FEED PROCESSING operations, the Moorman Manufacturing Co., Quincy, Ill., uses a fleet of 12 Clark lift trucks to handle, palletize and store separately 55 different items. A unique safety program, built around the truck operation, has resulted in an excellent safety record for the truck drivers.

On the back of every truck, a frame is mounted to receive a card bearing the driver's name. On this card, gold stars are affixed—one for each year of accident-free operation for the driver. Moorman's present 12 drivers have won a total of 78 stars, which are displayed on their individual cards, carried on the truck being driven.

In the plant, a traffic safety commission determines the eligibility of individual truck drivers for star awards, which are presented each year. The commission has compiled and edited an official company rule book for truck operators. It also maintains a driver training program, and investigates any reported traffic hazards.

Photo: Clark Equipment Co.
Truck operator inserts name card in truck bracket. Rack at left holds other cards



For Accurate, Reliable Temperature Control

STACON V SERIES
Self Operating Temperature Regulators—

Feature a liquid filled thermal system for high operating power and uniform throttling action and has built-in over-load protection. Available in 50°F. and 100°F. ranges from 25° to 325°F. Direct and reverse acting units ¼" to 1½" with screwed ends, and 2" to 4" with flanged ends. Bulletin No. 500. (Cash Standard Stacon Corp.)

STACON TYPE VS
Temperature Safety Regulators—

Used in the supply steam or gas line and will protect a process by snapping shut when the process temperature goes above a desired temperature level. Easily adjustable and remains closed until manually reset. Available in sizes from ½" to 1½" with screwed ends. (Cash Standard Stacon Corp.)

CASH STANDARD TYPE 51
Indicating Controllers—

An air operated, mercury actuated proportional temperature controller. Temperature ranges from —40°F. to 1000°F. Calibrated set point adjustment, unit construction, air relay with sapphire orifice and push button cleaner, feedback type proportional control with 1-100% band and differential gap. Also available with 1-150% proportional band combined with automatic reset action. Bulletin No. 978. (A. W. Cash Co.)

CASH STANDARD TYPE 30
Diaphragm Control Valve (With Type 51 Mounted)

A rugged, dependable control valve—available in sizes ½" to 12" with various styles of inner valves—reverse or direct acting. Accurate control is assured when the Type 30 is used with 51 or 57 controllers, valve mounted as illustrated, or where the controller is installed remotely. Bulletin No. 980. (A. W. Cash Co.)

CASH STANDARD TYPE 57
Recording Controllers—

An air operated temperature controller with mercury, vapor, gas or organic liquid actuation. Temperature ranges from —350°F. to 1200°F. Available in 9" and 12" case size, spring or electric driven chart drive, on-off control or 1-100% proportional control.

All units have push button nozzle cleaner; proportional controllers also have sapphire jewelled relay orifice with push button cleaner. Bulletin No. 979. (A. W. Cash Co.)

WHAT'S *YOUR* TEMPERATURE CONTROL PROBLEM?

Cash Standard and Stacon have the answer or will find one.

Contact the Cash Standard temperature and pressure control specialist in your area, or write Dept. D.

CASH CS STANDARD

A. W. Cash Co. and Its Subsidiary, Cash Standard Stacon Corp.
P. O. Box 551, Decatur, Ill.

PRESSURE, HYDRAULIC, TEMPERATURE, PROCESS AND COMBUSTION CONTROLS

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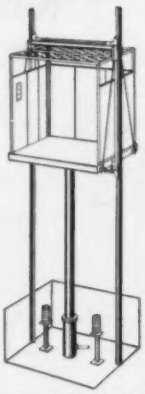
Most practical elevators for rises up to 55 feet

ROTARY OILDRAULIC® ELEVATORS need no penthouse or heavy sidewalls

Save up to 25% on elevator costs—Oildraulic Elevators are designed for low-cost installation and economical, trouble-free operation. No penthouse or heavy load-bearing shaftway structure needed... powerful hydraulic jack supports car and load. Rugged car construction withstands shocks and jolts of power truck loading. Automatic floor leveling within ¼" guaranteed, regardless of load size or rate of speed. Car sizes, capacities and controls as required.

Over 100,000 Oildraulic Elevators and Lifts are now in use. Rotary's coast-to-coast field organization provides prompt, efficient installation and service. Mail coupon below for catalogs.



MAIL NOW FOR NEW ELEVATOR CATALOGS

Rotary Lift Co., 1122 Kentucky, Memphis 2, Tenn.
Send catalog on ☐ freight ☐ passenger elevators to:

Name_____

Address_____

City_____ State_____

Rotary® **OILDRAULIC® ELEVATORS**

For Freight or Passenger Service

For more facts circle 541 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 52)

The two halves of the coupling are held together axially by a pair of cotter pins, D, which fit in holes drilled axially through the female member and intersect one peripheral groove in the tapered plug. When the legs of the cotter pins are spread, a safe lock for the coupling is obtained.

Magnets Keep Cloth Clean

ENGINEERS IN A PLANT producing sized warp yarn for weaving have overcome a problem presented by the occasional presence of minute rust particles concealed in the liquid size mixture or in dry starch, by using permanent magnetic separators.

Fig. 1. Interior element of pipeline trap is easily removed for cleaning

Fig. 2. Drawer-type magnetic element is wiped clean of ferrous particles

The firm has installed two pipeline

A good trade mark to look for

WHEN BUYING MACHINERY AND EQUIPMENT

Builders of high performance machinery and equipment are careful in selecting all materials and components. Leaders have found through many years of experience that the high uniform quality and reserve strength of Diamond Roller Chains aid in long-life efficiency and dependable operation.

The Diamond trade mark on Roller Chain is a good mark to look for.

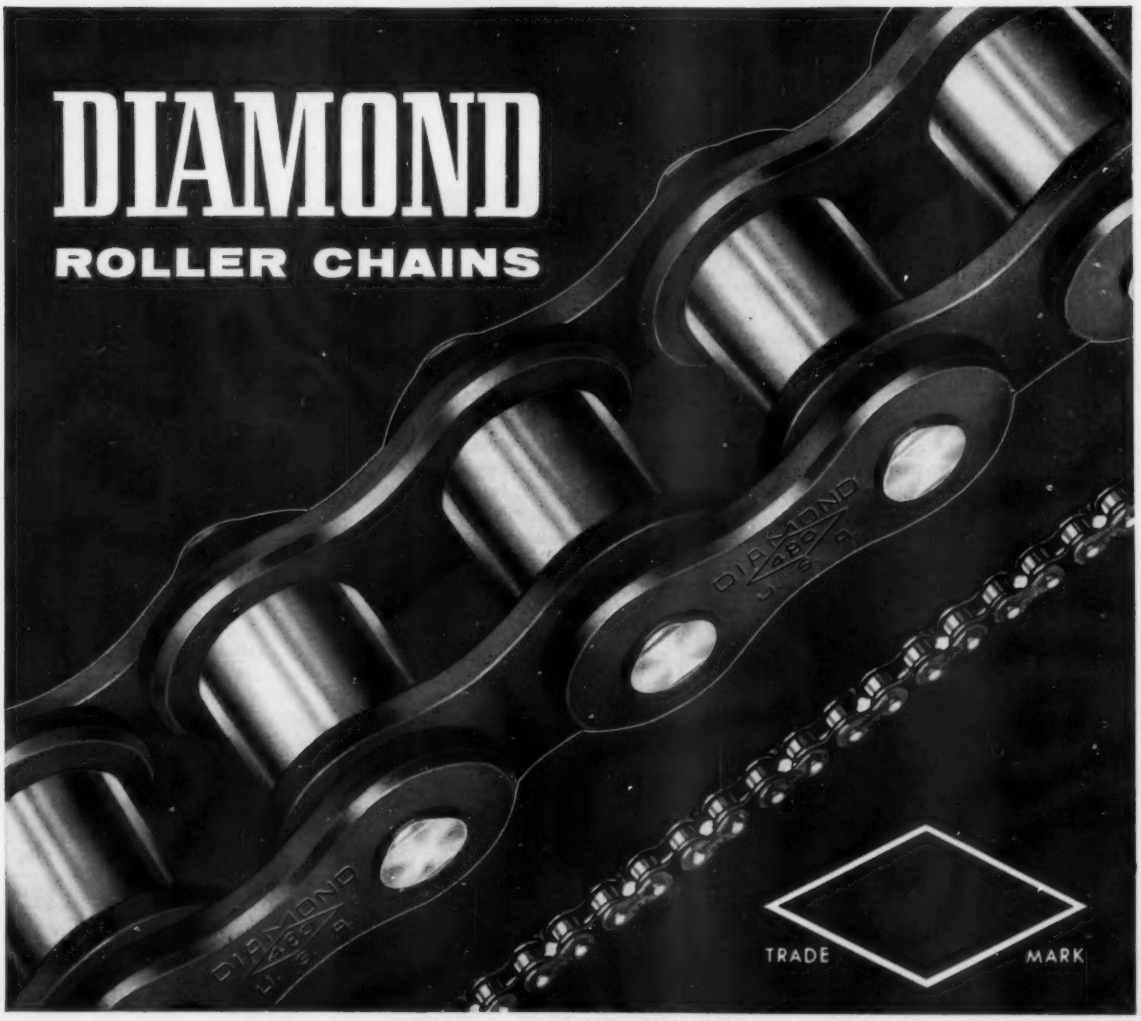
DIAMOND CHAIN COMPANY, Inc.

Where High Quality is Traditional

Dept. 614, 402 Kentucky Ave., Indianapolis 7, Indiana

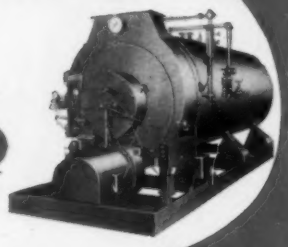
Offices and Distributors in All Principal Cities

Please refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER



For more facts circle 542 on Reply Card

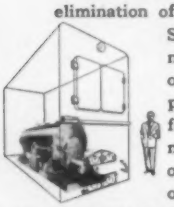
why is a CYCLOTHERM



like a **TRANSISTOR?**

...They both eliminate useless bulk

COMPACT—that's the word for today's radio, with modern transistor tubes replacing the big tubes of earlier days. And Cyclotherm, too,—the modern steam and hot water generator—is a case history in the elimination of useless bulk.



Saving up to one-third the space required by the ordinary boiler, Cyclotherm's exclusive, patented Principle of Combustion and Heat Transfer gives more horsepower per unit of weight, uniform heat transfer for every square foot of heating surface. Guaranteed to operate at a minimum of 80% efficiency, Cyclotherm gets more out of the fuel it burns, gives you substantial savings in gas or oil and in maintenance.

AN ELECTRONIC CONTROL SYSTEM operates Cyclotherm automatically. On 18 to 60 hp units, burner shuts down when steam demands are satisfied, starts up when steam again is needed. On larger units, precision modulation keeps peak efficiency with boiler operating at from 30% to 100% of rated capacity. Many users report up to 50% savings in maintenance costs.

Cyclotherm comes to you fully assembled and factory pre-tested. Needs only five simple connections to be ready to go. Many plants have installed two or more Cyclotherms for greatest flexibility and power. Burns gas or oil with quick changeover. In 18 to 500 hp models, 15 to 200 psi. Fill out coupon below and mail today.

YEARS AHEAD IN STEAM GENERATION

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STEAM AND HOT WATER GENERATORS

Cyclotherm Division
National-U. S. Radiator Corp.
3140 E. First St.
Oswego, N. Y.

Send me free copy of your full-information booklet on Cyclotherm Steam and Hot Water Generators.

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Name .....
Address .....
City ..... Zone .. State ....

For more facts circle 543 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 52)

traps in their liquid starch lines, between mixing kettles and homogenizers, and one drawer-type magnet grate to sift the dry starch as it comes to the weigh lorry. All the units were manufactured by Eriez Manufacturing Co., Erie, Penna.

The units are removing small rust particles from the starch, protecting the homogenizers and rubber slasher rolls from damage, and preventing rust spots from developing in finished cloth.

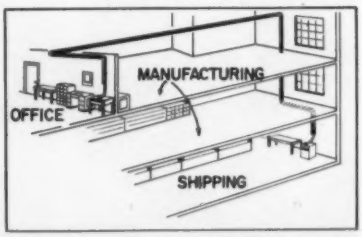
The Eriez Ferrotrap installed in the liquid starch lines consists of a stainless casing within which multiple stainless steel rods containing non-electric magnetic elements are so positioned that the liquid is forced to curve and recurve through them. This circuitous travel exposes any rust particles or other iron contamination to the magnetic field around the rods. Accumulations of metal, which adhere to the rods, are periodically removed by withdrawing the one-piece magnetic assembly from its casing and wiping the rods clean. See Fig. 1.

Similarly, a grate magnet cleans the dry starch. A series of parallel stainless steel tubes, containing Alnico V magnets, are mounted in a steel frame, as shown in Fig. 2. A steel grill guides the material in thin, multiple flows over the magnetic tubes. To remove the metal accumulations, the drawer-type frame is slid back, the grill lifted off, and rods wiped clean.

Airtube Comes In a Kit

WAITING TIME for the plant's lone elevator was the source of considerable delay and inefficiency in order handling at Nash Metalware Co., Inc., New York City. With the office on the second floor, manufacturing on the second and first floors, and the shipping department in the basement, the combination freight and passenger elevator which serves the three floors was always busy.

Incoming orders, received in the



Layout of airtube system that connects plant office with shipping department

How Steam Trap Standardization *reduces Installation and Maintenance Work and Cost*

No Bypasses Needed. Traps can be replaced in a couple of minutes by uncoupling the unions and installing a "spare" trap complete with proper length pipe connections and half unions.

ORIFICE SIZES	
PRESSURE	SIZE
0-40	7/16
40-60	3/16
60-150	1/16

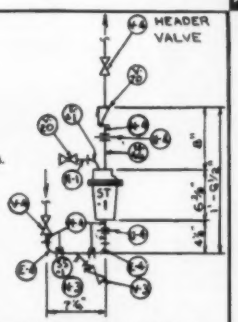
CAPACITY-0-300#/HR

NOTES:

DIMENSIONS SHOWN ARE FOR MINIMUM SPACE INSTALLATION.

IN LONG RUNS - PIPE TO BE PITCHED TOWARD TRAP.

TRAP TO BE INSTALLED BELOW DRAIN POINT IF POSSIBLE. IF NOT POSSIBLE, A CHECK VALVE MUST BE INSTALLED ON INLET SIDE OF TRAP.



BILL OF MATERIAL FOR TYPICAL STEAM TRAP HOOK-UP

MARK	REQD	MAT'L	DESCRIPTION
ST-1	1	[illegible]	1/2" STEAM TRAP - ARMSTRONG #211
SS-1	1	[illegible]	1/2" STRAINER - 250# W.S.P. - [illegible]
V-4	2	BRZ	1/2" GATE VALVE - SCRD - 200# W.S.P. - [illegible]
V-20	1	BRZ	1/2" GLOBE VALVE - SCRD - 200# W.S.P. - [illegible]
V-3	1	BRZ	1/2" GATE VALVE - SCRD - 200# W.S.P. - [illegible]
V-70	1	BRZ	1/2" CHECK VALVE - SCRD - 200# W.S.P. - [illegible]
E-4	2	F&CD [illegible]	1/2" - 90° SCRD ELL - 2000#
E-41	1	F&CD [illegible]	1/2" - 90° STREET ELL - 3000# - [illegible]
U-4	2	F&CD [illegible]	1/2" UNION - 2000#
N-1	1	STL	1/2" SHORT NIPPLE - SCH. 80 - SEAMLESS ASTM A-53
N-3	1	STL	1/2" SHORT NIPPLE - SCH. 80 - SEAMLESS ASTM A-53
N-4	6	STL	1/2" SHORT NIPPLE - SCH. 80 - SEAMLESS ASTM A-53
N-4/4	1	STL	1/2" - 4" LG. NIPPLE - SCH. 80 - SEAMLESS ASTM A-53

Standardized hookup includes test valve for trap testing, strainer, blowdown valve for cleaning trap, shut-off valves and unions for quick replacement.

Trap Maintenance Costs Reduced $25,000 per Year with Armstrongs

Major reductions in steam trap installation and maintenance work and cost can be achieved by standardization on one make of trap which, in turn, permits standardized hookups. A major chemical company reports an annual maintenance saving of $25,000 since installing 4000 Armstrong traps according to the drawing and photograph shown here. Additionally, trap parts inventory is reduced and purchasing is simplified.

Traps of a Size Interchangeable. Note that exact dimensions are given for the pipe fittings, including nipples connected to each size of trap. When a trap needs repair, the unions can be uncoupled, the trap lifted from the line, and a "spare" carrying identical pipe connections slipped in place. In as little as one or two minutes, a faulty trap is replaced. It is then repaired and takes its place as a "spare".

$25,000 Trap Maintenance Saving. Records on the Armstrong trap installation described here show that the cost of repair parts was approximately $10,000 less annually than with the traps previously used. Reduction in maintenance labor brings the total saving to $25,000, per year. *And, fuel savings attributable to the traps are at least equal to the maintenance saving.*

FOR COMPLETE INFORMATION on the traps that slash maintenance costs ask for the Armstrong Steam Trap Book containing complete data plus selection, installation and maintenance recommendations. Call your local Armstrong Representative or write.

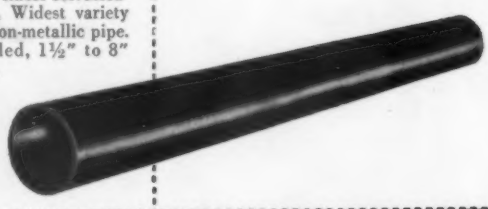
ARMSTRONG MACHINE WORKS, 912 Maple Street • Three Rivers, Michigan

ARMSTRONG STEAM TRAPS

For more facts circle 544 on Reply Card

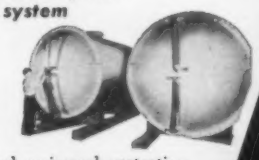
OLDEST PLASTIC PIPE STILL "TOPS"

ACE hard rubber . . . now more than a century old . . . long the finest corrosion-resistant pipe available. Widest variety of fittings of any rigid non-metallic pipe. Sizes ¼" to 8" threaded, 1½" to 8" flanged. *Bulletin CE-51.*



LIFE-TIME
ACID STORAGE TANKS

Rubber-lined by ACE
2-layer system

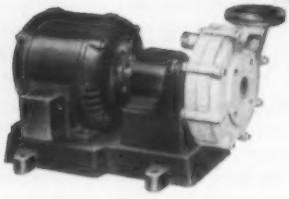


Economical, universal protection against all alkalis, metallic salts, practically all inorganic acids, hydrochloric acid any strength, sulphuric to 50%, nitric to 20%, phosphoric to 75%. Good to 160 deg. F. . . . sometimes higher. Soft rubber interlayer aids shock resistance.

ACE chemical equipment

"more resistant to more corrosives"

Complete line of rubber and plastic processing equipment . . . eight basic materials for pipe and fittings, valves, pumps, tanks, molded parts, utensils, etc.



ACE "WAM" . . . THE FINEST
Non-metallic Acid Pump

On job after job, this 80-gpm. centrifugal pump has earned highest praise. Hard rubber casing and impeller, Hastelloy C shaft. Handles nearly all corrosives. Mechanically simple, trouble-free. *Bulletin CE-55.* Larger ACE pumps available.

TOUGH ACE-ITE PLASTIC PIPE

General-purpose moderately priced rubber-plastic pipe handles most common chemicals to 170 deg. F. . . . except few strong acids and organic solvents. Tough, odorless, tasteless. Rigid pipe ½" to 6". *Bulletin 80.*

ACE rubber and plastic products

AMERICAN HARD RUBBER COMPANY
93 WORTH STREET • NEW YORK 13, N. Y.

For more facts circle 545 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 52)

office and processed, were either taken by one of the office girls to the shipping department in the basement or picked up by the foreman who would come upstairs from the shipping department. Since the elevator was constantly being used to move stock between the manufacturing and shipping floors, a five-minute wait for the elevator was not uncommon.

After the installation of a packaged, install-it-yourself airtube system, manufactured by the Lamson Corp., benefits became immediately apparent. Nine-in. plastic airtube carriers, traveling at 20 ft per second, deliver orders from the office to the shipping department as soon as processed, and copies of completed orders are shuttled back to the office when shipments are made.

Plant personnel estimate that this simple, inexpensive airtube system has increased plant communications efficiency 100 per cent and saves the equivalent of one man's full time.

Tap Change Record Card

Load tap change record stickers, supplied on LTC power and medium transformers by General Electric Co. permit operators to keep a log of voltage level, band width, compensator and time delay setting, plus number of operations. Adhesive backed, tags are 5 in. by 5 in.

Dye Penetrants Find Flaws

The following comments were excerpted from an article which appeared in the Bureau of Ships Journal, by R. E. Lyons, of the Bureau of Ships, U. S. Navy.

Liquid penetrant inspection, like the older oil and whiting test, is used principally to examine the surfaces of nonferrous metals for discontinuities such as cracks. The method re-

veals only those defects or flaws open to the surface.

When critical welds are being deposited, the penetrant test can be used to examine the first weld pass, in addition to the final and possibly each intermediate pass.

For repair welding, the prepared cavity can be examined with penetrants to make certain that the weld will be deposited on sound metal. The penetrant test can also be used to examine ground or back-chipped roots of double V- and T-welded joints.

Liquid penetrants are of two general types. One is water-washable; the other must be removed from a metal surface with a solvent. Water-washable penetrants require an emulsifier that is already incorporated in the penetrant, or that is applied separately to metal surfaces after the penetrant is applied.

Inspection procedure for both types of penetrants usually consists of the following steps:

a. Clean the metal surface.
b. Apply the penetrant.
c. Allow sufficient time for the penetrant to soak in.
d. Remove excess penetrant.
e. Dry the metal surface, if necessary.
f. Apply the developer.
g. Observe the penetrant patterns of discontinuities, if present.
h. After the test, remove any remaining developer and penetrant.

Penetrants are applied by brushing, spraying, or dipping, and the surfaces should be kept wet with the penetrant for a minimum of 2 minutes. Longer periods—10 to 20 minutes—should be used to locate tight cracks, such as grinding cracks and cracks in wrought metals.

Patterns of surface discontinuities or flaws will appear in approximately 2 minutes, but the developer should be allowed to remain 10 or 15 minutes to draw the penetrant out of the flaws. The developer itself is a good background for good contrast with indications. When a fluorescent developer is used, parts should be examined for flaws with an ultra-violet light in a darkened enclosure.

Linear or straight line patterns of the developer stained by the penetrant are indicative of cracks or similar openings, such as laps or cold shuts. Scattered dots may be caused by pits or porosity. Dots in alignment may result from a tight crack, and circular or square patterns in cast parts indicate unfused heads of chaplets.

All discontinuities revealed by the penetrant do not necessarily have to be repaired. The extent of repair depends upon the type of discontinuity and upon the part and its application.

Materials handling is faster with the economical R-W "460"

the only completely packaged continuous power chain conveyor!

Here's an overhead conveyor designed to meet the light-load handling needs in your plant. It's the R-W "460"—a unique, continuous power chain conveyor—with three outstanding advantages: requires no special engineering; easily adapted to any plant layout; and it can be quickly installed by your own personnel.

Shipped completely packaged from stock, the R-W "460" combines unusual flexibility, convenience and safety with special economies due to lower load limits. Use it as a supplementary conveyor unit on production lines, drying ovens, washers, paint sprayers, degreasers and similar operations in which a heavy-duty conveyor is not required.

Ask for descriptive Richards-Wilcox Catalog A-96.

Shipped from stock throughout the U. S.—in easily handled packaged units. Available up to 200-ft. maximum lengths only, the R-W "460" has capacities of 8½-lbs. on 6-in. centers, or 17-lbs. per lineal foot, and 200-lb. drawbar pull.

Richards-Wilcox MANUFACTURING COMPANY
Materials Handling Division

Use RICHARDS-WILCOX INDUSTRIAL & FIRE DOORS DOOR HARDWARE ELECTRIC OPERATORS Made for each other

Branches in Principal Cities
460 WEST THIRD STREET, AURORA, ILLINOIS
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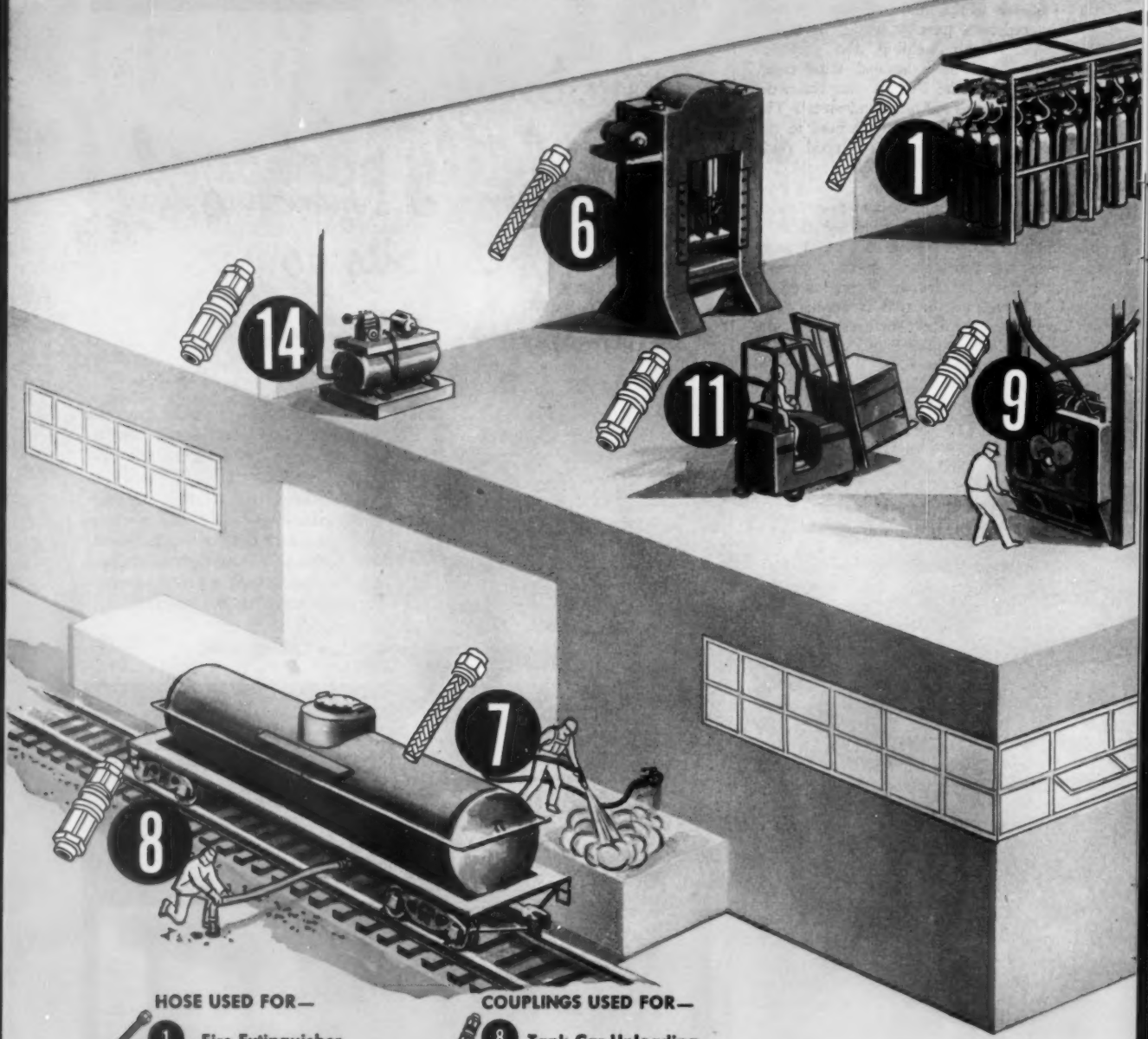
Leakproof couplings and durable metal hose... versatile problem-solvers for any industrial plant



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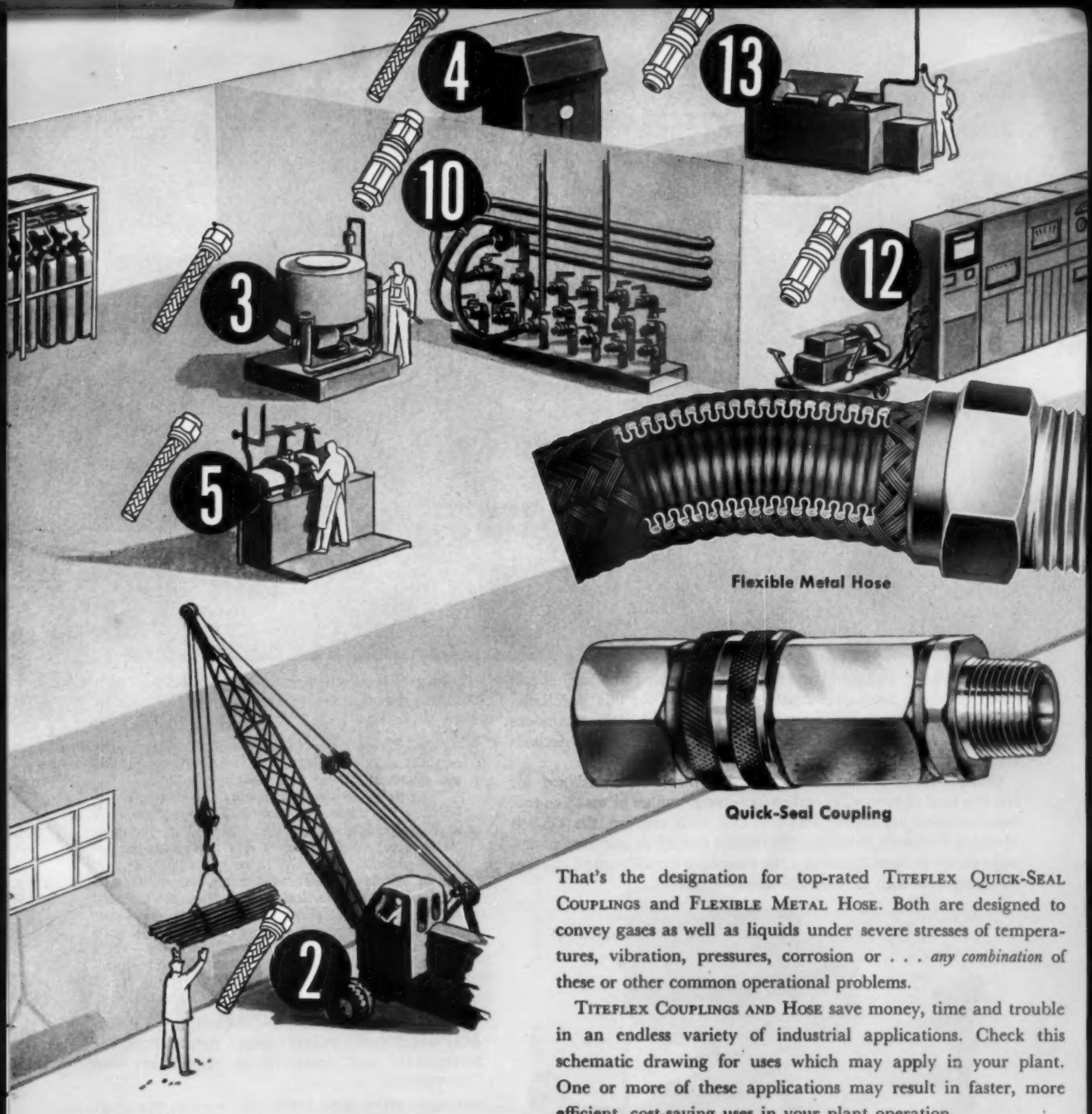
TITEFLEX Couplings Metal Hose for any corrosion, temperature, vibration, or pressure problem



Flexible Metal Hose

Quick-Seal Coupling

That's the designation for top-rated TITEFLEX QUICK-SEAL COUPLINGS and FLEXIBLE METAL HOSE. Both are designed to convey gases as well as liquids under severe stresses of temperatures, vibration, pressures, corrosion or . . . *any combination* of these or other common operational problems.

TITEFLEX COUPLINGS AND HOSE save money, time and trouble in an endless variety of industrial applications. Check this schematic drawing for uses which may apply in your plant. One or more of these applications may result in faster, more efficient, cost-saving uses in your plant operation.

Use coupon below for additional information. Your Titeflex representative will be glad to advise you.

QUICK-SEAL COUPLINGS

- *Absolutely* leakproof
- Couple-uncouple in ONE second—*without* tools
- Allow *free* flow
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- Braided or unbraided, in many alloys in many sizes or fittings
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in all industrial plants

Variac® motor speed controls

. . . "We use them with Confidence"

Variac Motor Speed Control mounted on Gisholt No. 4 Superfinishing Attachment.

Speed control apparatus used with superfinishing and high-speed, metal-polishing equipment must be of the best for this is delicate, exacting work. Such speed controllers must be capable of smooth control over a wide range of speeds, and operation must be as dependable and trouble free as possible.

General Radio Variac Motor Speed Controls were designed for just this kind of service . . . and an increasing number of machine-tool manufacturers are finding this out. One such concern, the Gisholt Machine Company, now uses this motor control as standard equipment on all its Superfinishing Attachments to simplify speed changes on workpieces with varying diameters.

Type 1701-AK VARIAC Motor Speed Control, For 1/15 hp Shunt-Wound D-C Motors, Mounted on Gisholt No. 3 Superfinishing Attachment.

Motor control is equipped with Speed Control knob and dial, Forward-Reverse switch, On-Off line switch, 0-1725 and 0-3450 rpm switch, Slow-Blow Fuse, and Pilot Light. This compact unit is readily mounted on bench, wall, shelf, or assembled as an integral part of any machine.

Fifteen other Units from 1/15 hp to 1½ hp are available in both cabinet and stripped-down models. Prices range from $67 to $380. WRITE FOR THE VARIAC MOTOR SPEED CONTROL BULLETIN for complete data.

Leonard Hesse, engineer at the Gisholt Machine Company, has this to say of his Company's choice in motor drives:

"The Variac Motor Speed Control was selected after very thorough consideration with respect to available equipment. It fills our needs well.

"Our prime requirement was that the drive be as reliable in operation as is possible. Low-speed performance was particularly important as our Superfinishing Attachments must be run at very low speeds for extended periods.

"In conclusion, the compactness, simplicity and ruggedness of this particular piece of equipment would seem to make it useful in any kind of shop, and under all sorts of conditions. We feel we can use it on all types of Superfinishing applications with confidence — this includes single-piece set-ups as well as production runs."

★ ★ ★

The G-R Variac Motor Speed Control is a motor drive which easily meets stringent specifications for performance and dependability. Advantages and Conveniences . . .

OPERATES D-C MOTORS FROM A-C LINES: plugs into ordinary 115 or 230-volt lines, converts this power to d-c, and provides all the advantages of d-c motor operation.

WIDE SPEED RANGE: at constant output torque.

EXTRA QUICK START-STOP-REVERSE: under heavy load conditions.

DYNAMIC BRAKING: on all larger models.

NO ELECTRON TUBES: selenium rectifiers make for ruggedness and reliability, require no warm-up time.

PERFECTLY SMOOTH CONTROL: from few rpm to rated speed.

LONG LIFE: with minimum maintenance; built-in overload protection prevents motor burnout.

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WE SELL DIRECT
Prices are net, FOB Cambridge or West Concord, Mass.

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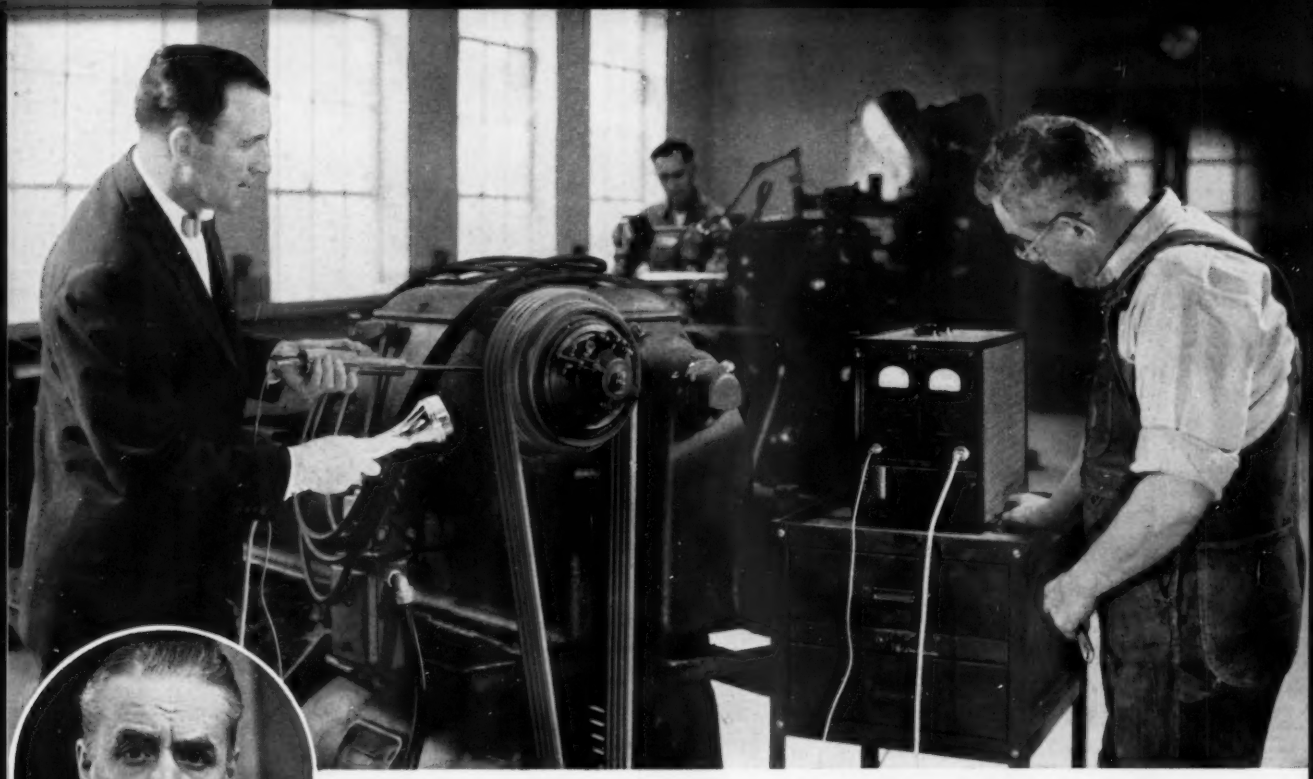

"You say I can see vibration, measure it, and eliminate it?"

1 "How much vibration do you think my machine has?"

No need to guess—the Veelos Vibration Analyzer shows exactly! This amazing electronic tester measures vibration amplitude down to *2-millionths of an inch*—tests one belt against another, actually shows which belt has "invisible shakes" . . . and how much! Don't guess about vibration; it's costing you hard cash every minute you ignore it. Ask your Veelos salesman to test your belts with the Vibration Analyzer.

2 "Isn't vibration caused by a number of things?"

Vibration can be caused by bearings, motor, clutch, sheaves or V-belts. Quite often it is caused by V-belts alone. The Veelos Vibration Analyzer uses a "strobe" light which "stops" the motion—shows exactly *what* is vibrating! It shows you precisely how much vibration you're paying for, and lets you correct it. The Vibration Analyzer gives positive proof, and the test takes only 15 minutes. It's free, of course.

3 "How do I eliminate costly belt vibration?"

Install Veelos, in place of ordinary V-belts! V-belts have spots of varying density, due to their construction, which throw them out of balance. Veelos belts are absolutely uniform; every stud and link is identical; *every foot of the reel* is identical and uniform; and they're perfectly balanced! Test any belt for vibration against Veelos—you're in for a shock. Your Veelos salesman will show you how to cut costs and improve your operation.

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VEELOS
THE BALANCED
LINK V-BELT

Veelos is known as Veelink outside U.S.A.

For free vibration analysis or Veelos Data Book write to:

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"Industrial Belt Specialists Since 1911"

Adjustable to any length • Adaptable to any drive • Balanced power • Constant power • Vibrationless power

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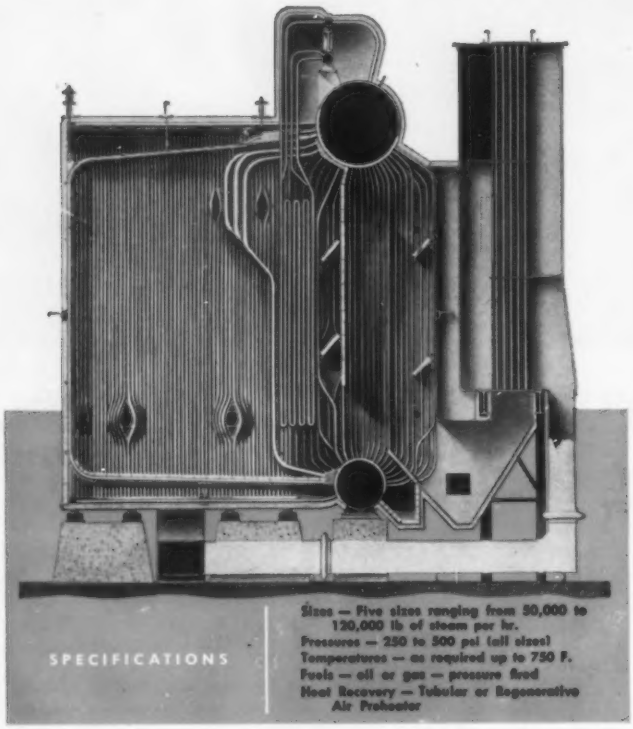
TODAY'S OUTSTANDING BOILER BUY

for capacities from 50,000 to 120,000 lb of steam per hour!



SPECIFICATIONS

Sizes — Five sizes ranging from 50,000 to 120,000 lb of steam per hr.
Pressures — 250 to 500 psi (all sizes)
Temperatures — as required up to 750 F.
Fuels — oil or gas — pressure fired
Heat Recovery — Tubular or Regenerative Air Preheater

The VU-55 — a development of Combustion's basic Vertical Unit design — offers features never before available in a boiler of its capacity range. If your steam needs call for a unit in the 50,000 to 120,000-lb class, you will find it worth while to consider the economic and operating advantages assured by these VU-55 features:

TANGENTIAL FIRING. More than 20 years of application experience have established the exceptional advantages of tangential firing, illustrated and briefly described below. About 90 percent of Combustion's large utility installations use this advanced method of firing.

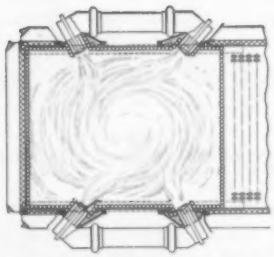
DOUBLE WALL, PRESSURIZED CASING. The latest development in casing construction for pressure firing of boilers in the size class of the VU-55, this casing, as illustrated and described below, is designed to assure lifetime tightness with minimum heat loss. Pressure firing permits the elimination of an induced draft fan with its attendant operating and maintenance costs.

TANGENT FURNACE TUBES. The VU-55's furnace tube arrangement provides complete heat-absorbing, water-cooled protection on all furnace walls. Furnace maintenance is minimized, since the design eliminates all exposed refractory surfaces.

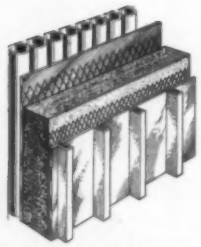
HIGH STEAM QUALITY. Equipped with a large (60-in.) steam drum, the VU-55 has generous water capacity and steam reservoir space. C-E drum internals assure high quality steam at all ratings.

STREAMLINED EXTERIOR. The overall appearance of the VU-55 reflects the efforts of its designers to achieve a completely unobstructed casing, while retaining adequate access wherever required and every facility for convenient operation. There are no outside downcomer tubes, and ducts from air heater to burners are beneath the furnace floor.

Your request for further information on the VU-55 Boiler will receive prompt attention



PLAN VIEW OF FURNACE showing arrangement of burners for tangential firing. Flame streams from the four burners impinge upon one another at high velocity, creating a turbulence unattainable by any other method of firing. The result is rapid and complete combustion. As the gases spiral upward, they sweep all furnace heating surfaces, assuring a high rate of heat absorption.



PERSPECTIVE OF FURNACE WALL. Construction consists of tangent tubes backed up successively by welded steel panels, 4 inches of high quality insulating material and an outer steel casing formed as shown to provide adequately for expansion and assure ample strength. Low heat loss and the tightness required for pressure firing are assured by this welded, double-wall construction.

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CUT OPERATING COSTS
SAVE HOURS DOWNTIME

Long hours spent waiting for tanks to heat or cool are not productive, nor are the hours spent in waiting for pipe coil repairs. Fill each day with more productive hours by using Tranter Platecoil heat transfer units. The greater prime surface of these units provides faster cooling or heating and adds productive hours. Installed on simple, quick-change hangers, Platecoils can be removed and replaced quickly without the use of a hoist or other machinery — saving maintenance hours and dollars.

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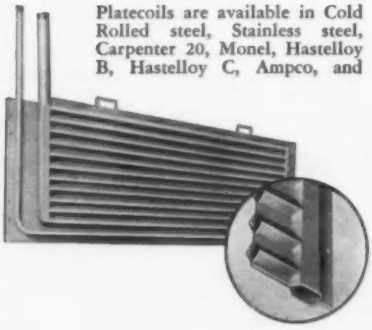

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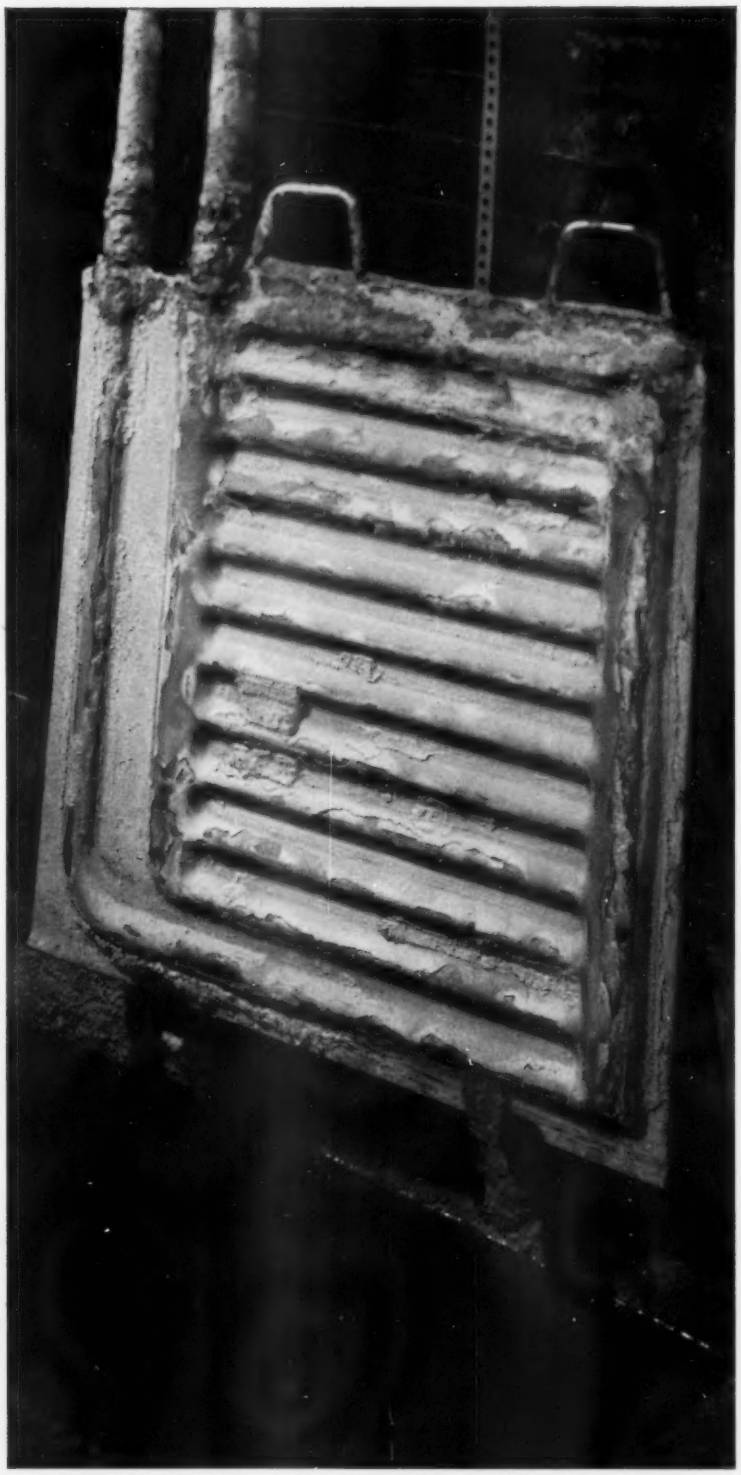
BLENDING TIME REDUCED AT PROTECTION PRODUCTS

4 to 6 HOURS SAVED IN HEAT UP TIME

Faster, more uniform heat transfer has been experienced with Platecoils in blending components of chemical preservatives. To provide ease of installation, these Tranter Platecoils were rolled to fit the tank.

Platecoils heat 1,800 gallons of water from room temperature to boiling in 2 hours at Athens Stove Works, saving 4 to 6 hours. Maintenance costs were reduced 25%.



NO MAINTENANCE IN OVER A YEAR

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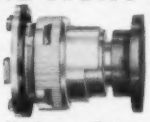
Square D pushbuttons, designed to JIC and NMTBA standards, have been proven by severe tests involving millions of operations. They offer still other features...generous wiring space and exclusive "*Slide and Swing*" enclosure covers for easier, faster installations when machine operations are changed.

OIL-TIGHT OPERATORS

Momentary Contact Guarded button in 7 colors.



Mushroom Button 1⅛" or 2¼". Momentary contact. 7 different colors.

Selector Switch 2 or 3 position with 4 different cams.

Coin-operated Selector Switch Available in same selection as standard type.

Key-operated Selector Switch Discourages unauthorized operation.

Selector Pushbutton combines selector switch and pushbutton. 2 or 3 position.

Padlock Attachment Latch type. For momentary contact buttons. Locks "OFF" position.

Padlock Attachment Cover type. Prevents depressing button.

Maintained Contact Attachment Used with 2 operators, 1 contact block.

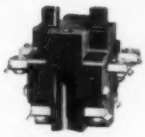
Selector Switch Lockout Permits switch to be locked in any one of three positions.

Wobble Stick Operator for momentary pushbutton operator. Ideal for emergency stop with pendant station.

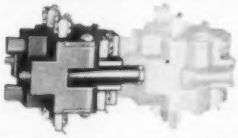
Neoprene Cap for momentary contact button. Prevents liquids, dust and grit from working into pushbutton operator.

CONTACT BLOCKS and PILOT LIGHTS

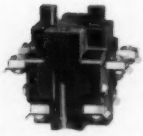
Single Pole N.O. and N.C. Contacts



Duplex N.O. and N. C. Contacts



Tandem Operation. Duplex N.O. and N.C. Contacts with extended stems for combination with another block.



Duplex N.O. and N.C. Contacts with one N.O. circuit closing ahead of the other. Designed for 2-speed or sequence operations.

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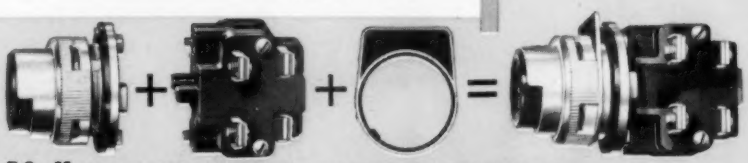

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Drain them, take them apart, make sure that all parts are working and free from corrosion.

Of course, if you already use Nicholson steam traps, you're in luck. They completely drain themselves when cold. And with just three parts, they're the simplest traps to look after when a checkup is in order.

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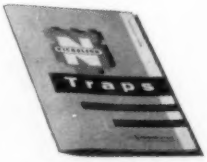

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CONSTRUCTION BRIEFS — a review of fundamentals for the plant engineer

Prepared by B. A. Wasil, Structural Engineer

WELDED CONNECTIONS

THE PRECEDING BRIEF began a discussion on connections, and the principles involved in the design of the simple riveted or bolted connection were developed. A discussion now follows on the ideas involved in the design of the simple welded connection.

As in the riveted connection, plates or structural shapes may be connected by welding with a lap joint or a butt joint. In addition, a direct connection may be accomplished by a tee joint. The butt joint is always joined by a groove weld, whereas the tee joint may be accomplished by a groove weld or a fillet weld.

There are many types of groove welds illustrated in the A.I.S.C. manual. They vary in the way the structural members are prepared for welding and in the way the weld is accomplished—from one side or from both. In all cases the groove weld uses welding materials to connect each edge fiber of material from one member to the next. The actual thickness of a groove weld will vary from 1/32 in. to ¼ in. thicker than the structural elements being connected. However, for all groove welds the nominal thickness is the thickness of the plates and for most groove welds the effective thickness is also the thickness of the plates.

The allowable stresses in a groove weld for tension, compression and shear are the same for that of rolled structural steel in bending: tension, 20,000 psi; compression, 20,000 psi; shear 13,000 psi. Therefore, any groove weld, either butt or tee joint, where the effective thickness is the same as the nominal thickness, automatically satisfies stress conditions if the structural members themselves are satisfactory.

The fillet weld is by far the most common type of weld. It is used in all lap joints and many tee joints. It has the advantage of not requiring as close a tolerance of dimensions and does not require any special preparation of the edges of the members to be joined. Although for some connections a lap joint will require lap plates and take up more space than the butt joint, the welded connection will be smaller and simpler than the riveted connection.

The convexity or reinforcement of a fillet weld is ignored in determining the effective area of the weld. Figure 1 shows a cross section of a fillet

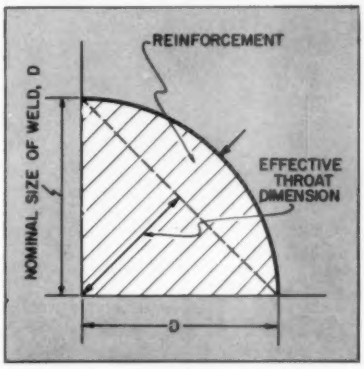

Fig. 1. Cross sectional view of typical fillet weld shows various components

weld. Note that nominal weld size, D, is greater than the effective throat dimension.

Figure 2a shows a longitudinally stressed fillet weld while Fig. 2b shows a transversely stressed fillet weld. In either case the critical stress in the weld will be in shear and in the plane of the effective throat (or at 45 deg to the horizontal).

The allowable stress in shear through the throat of a fillet weld is 13,600 psi. Since the effective throat dimension = 0.707D, where D is the nominal size of the weld (Fig. 1), the allowable load per inch of weld,

$$W = 13{,}600 \times 0.707D = 9{,}600\ D.$$

The value "W" is analogous to the rivet value "R," thus we refer to load per inch of weld as the weld value.

The design of a simple lap welded connection becomes a problem in:

1. Selection of size of weld
2. Determination of length of weld
3. Placement of weld to eliminate any possible eccentricity.

The heat caused by welding and subsequent cooling of the welded joint causes expansion and contraction of both the weld and the original material. If the shrinkages in the two materials are greatly different, stresses will develop in both the weld and the original material. For this reason it is important to limit shrinkage variations as much as possible by setting a minimum size weld for the thickness of the original structural element. Such minimum sizes of fillet welds are found in the A.I.S.C. specifications. The specifications also call for

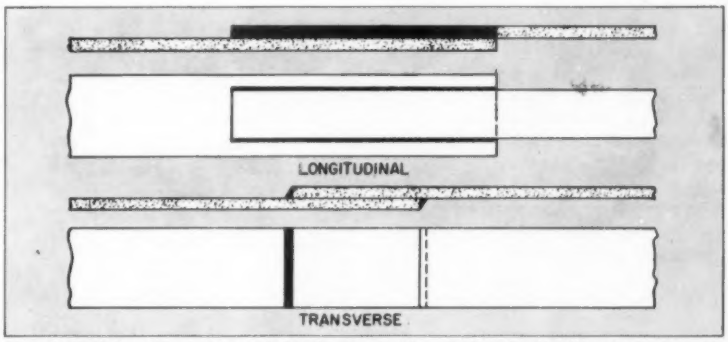

Fig. 2. Fillet welds joining plates in lap welds. A, longitudinally stressed weld, B, transversely stressed weld. In both cases, critical stress will be in shear

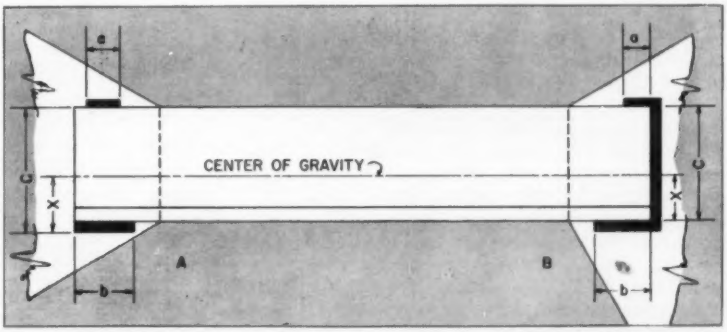

Fig. 3. Two joints of an angle to a plate with longitudinal welds at A and longitudinal and transverse welds at B. Weld B is calculated by components

the maximum effective size of a fillet weld as 1/16 in. less than the nominal thickness of the edge of a square cut plate and ¾ of the nominal thickness of an angle or flange.

Thus the majority of welds used are ¼ in. or 5/16 in., since smaller welds are difficult to lay and larger welds require two or more passes. It is usual to specify all welds at a particular size for a job except as noted for unusual situations.

The length of welds shall not be less than four times the nominal size and if longitudinal welds alone are used in an end connection, then the length of each fillet weld shall be no smaller than the distance between the welds. The specifications also call for end returns, wherever practical, equal to two times the nominal weld size. With the above limitations, the length of the weld is determined by dividing the load by the weld value, thus,

$$l = P/W.$$

It is usual practice then to distribute the weld where possible in such a manner that each inch of weld is subject to the same stress, thus preventing eccentricity. Where it is not possible to eliminate eccentricity, then of course the largest stress in the weld may not exceed its allowable stress.

In Fig. 3a an angle is connected to a plate by longitudinal welds "a" and "b." To prevent eccentricity, the following relationships must exist:

$$a = \frac{Px}{Wc}; \qquad b = \frac{P(c-x)}{Wc};$$

also by specifications,

a must be larger than 4D, and
a must be larger than c.

If "a" is enlarged to comply with specifications then "b" should be increased by the same ratio to keep the balance.

In Fig. 3b an angle is connected by a continuous weld which includes the transverse weld "c." Here,

$$a = \frac{Px}{Wc} - \frac{c}{2}; \quad b = \frac{P(c-x)}{Wc} - \frac{c}{2};$$

also by specifications,

"a + b + c" must be larger than 4D,
and "a" must be larger than 2D.

To illustrate the principles developed and also to compare welded and riveted construction, the same problem worked out in the Brief on riveting will be illustrated for welding.

In designing a welded truss it is customary to use a structural tee section for upper and lower chords and double angles for the verticals and diagonals. The angles are welded to the web of the tee, so the gusset plates used in riveted joints are eliminated. And, since the welding operation does not require cutting holes in the members, the gross area is used in designing tension members.

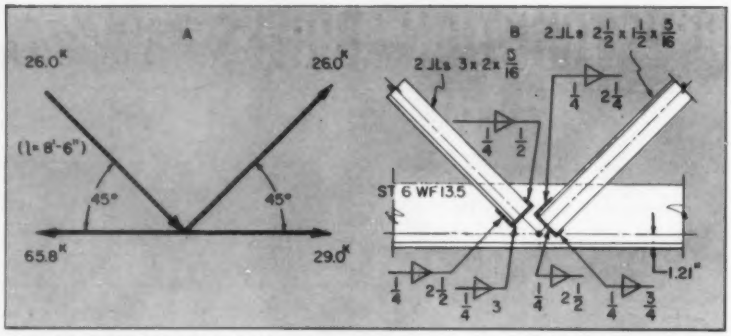

Fig. 4. Typical joint in bottom chord of a truss, as constructed by welding.

Design of Compression Diagonal

Assuming f = 10,000 psi, A (req'd) $= \frac{26{,}000}{10{,}000} = 2.60$ sq in.

Using ¼-in. welds, minimum thickness of members must be 5/16 in.
Try 2 angles, 3 × 2 × 5/16, long legs back to back

From the tables, A = 2.94 sq in., least r = 0.90, $l/r = \frac{8.5 \times 12}{.90} = 113$, and

f = 10,810 psi

Therefore, A (req'd) = 2.40 sq in.
Since the area of the proposed member is greater than the required area, the 3 × 2 × 5/16 angles are suitable.

Design of Tension Diagonal

A (req'd) $= \frac{26{,}000}{20{,}000} = 1.30$ sq in.

Minimum thickness for members is 5/16 in. (see above), so use smallest 5/16-in. angles, 2½ × 1½ × 5/16 in. Area of this member, 2.30 sq in., is adequate.

Design of Tension Bottom Chord

A (req'd) $= \frac{65{,}800}{20{,}000} = 3.29$ sq in.

Use ST 6 WF 13.5
From the tables, A = 3.98 sq in., so member is suitable.

Design of Welds

W for ¼-in. welds = 2.4 kips/in. of weld

P to each angle $= \frac{26.0}{2} = 13.0$ kips

Therefore, inches of weld required $= \frac{13.0}{2.4} = 5.42$ in.

Distribution of Welds

For compression member (3 × 2 × 5/16), c = 3 in.
From A.I.S.C. manual, x = 1.02 in.

$$a = \frac{13.0 \times 1.02}{2.4 \times 3} - \frac{3.0}{2} = 1.84 - 1.50 = 0.34 \text{ in.}$$

$$b = \frac{13.0\ (3.0 - 1.02)}{2.4 \times 3} - \frac{3.0}{2} = 3.58 - 1.50 = 2.08 \text{ in.}$$

a + b + c = 5.42 in.
But a is less than 2D, so make a = ½ in.

thus increase b $= \frac{2.0}{1.84} \times 3.58 - 1.50 = 2.40$ in. (or 2½ in.)

For tension member (2½ × 1½ × 5/16), c = 2½ in.
From A.I.S.C. manual, x = 0.90

$$a = \frac{13.0 \times 0.90}{2.4 \times 2.5} - \frac{2.5}{2} = 1.95 - 1.25 = 0.70 \text{ in. (or } \tfrac{3}{4} \text{ in.)}$$

$$b = \frac{13.0\ (2.5 - 0.90)}{2.4 \times 2.5} - \frac{2.5}{2} = 3.47 - 1.25 = 2.22 \text{ in. (or } 2\tfrac{1}{4} \text{ in.)}$$

a + b + c = 5.42 in.

Figure 4b shows a complete design. Where sufficient room is not available for the required weld length, slot or plug welds can be used for build-up.

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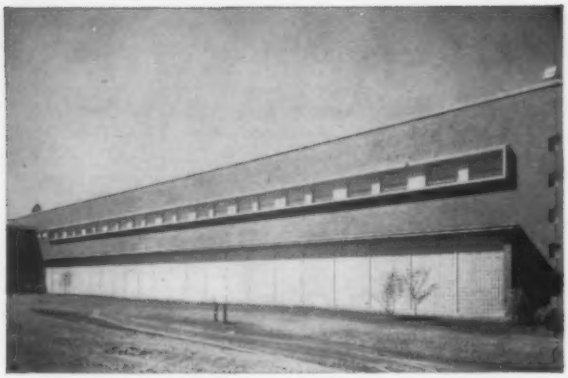

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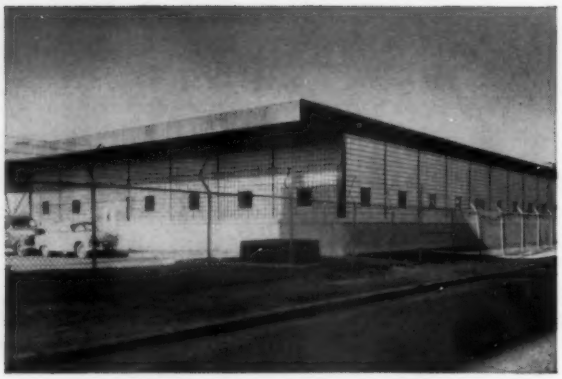
"We saved on window shades"



New England Butt Co., Providence, R.I.
"We saved on heating costs"

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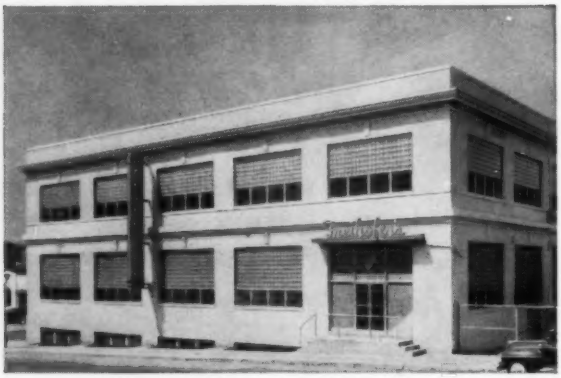

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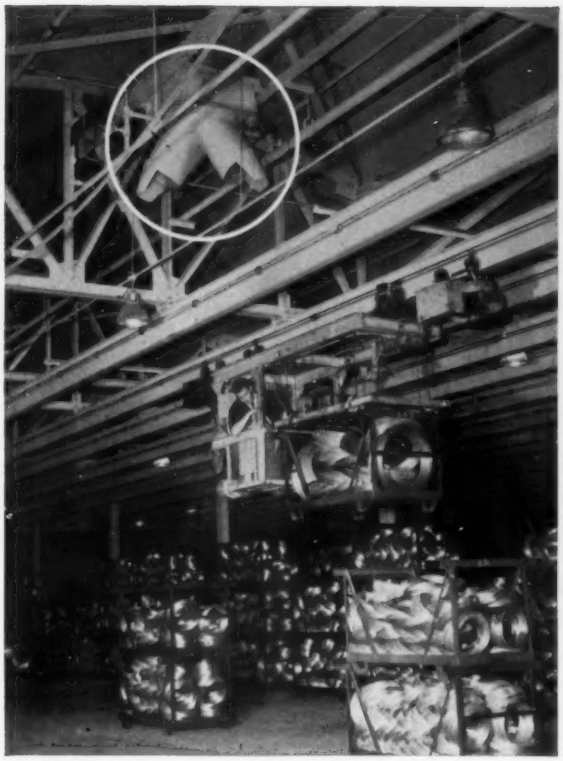

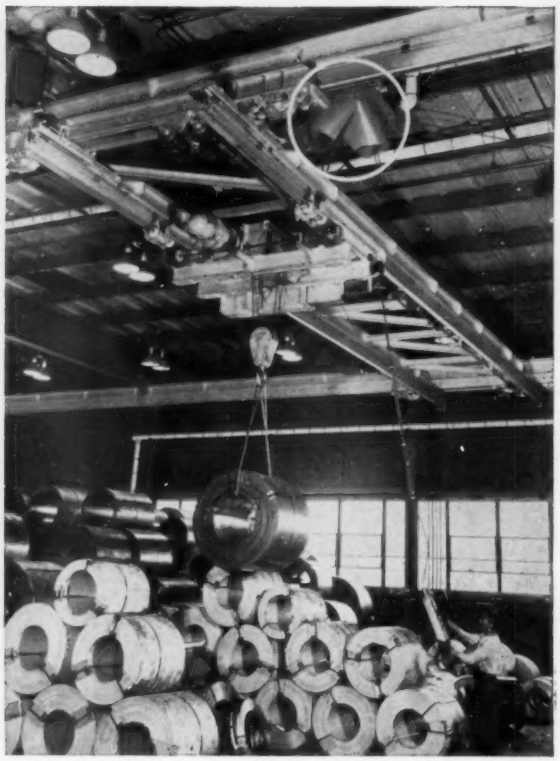

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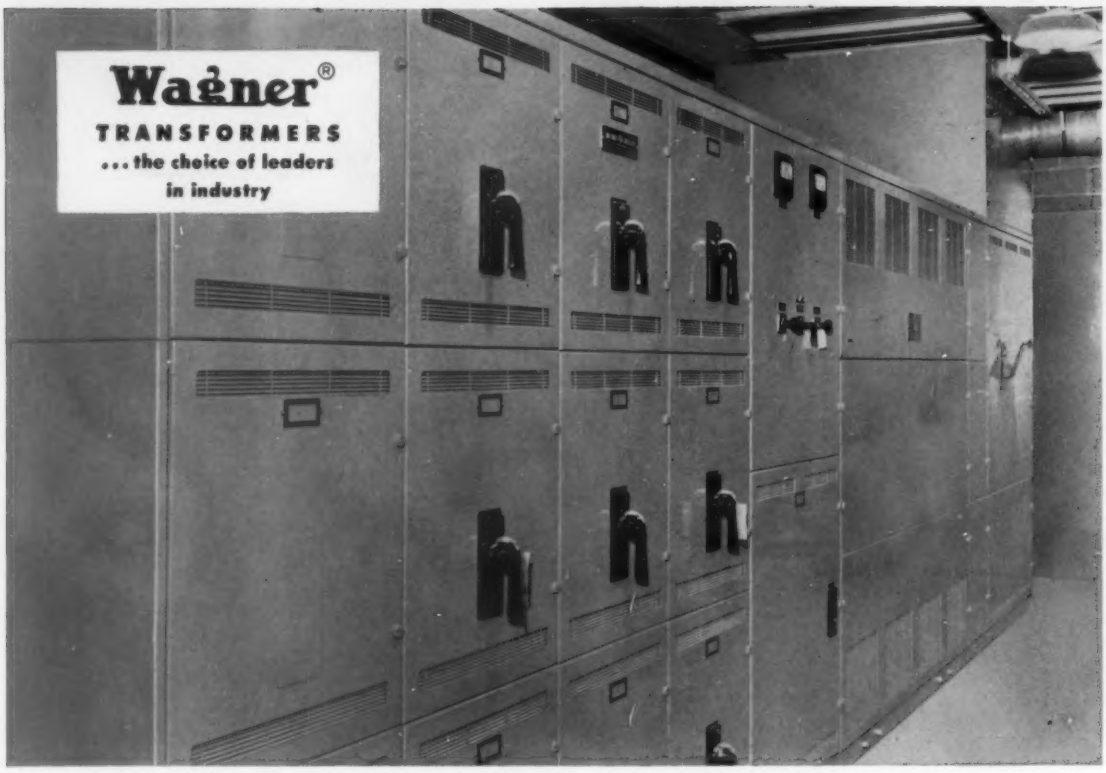

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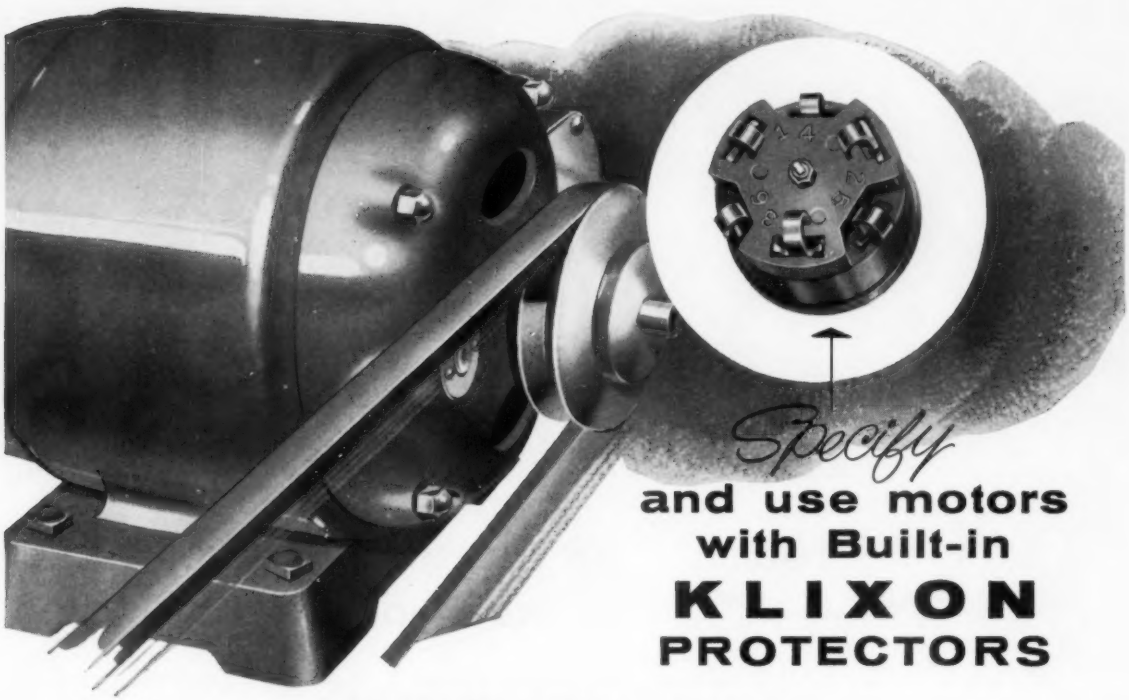

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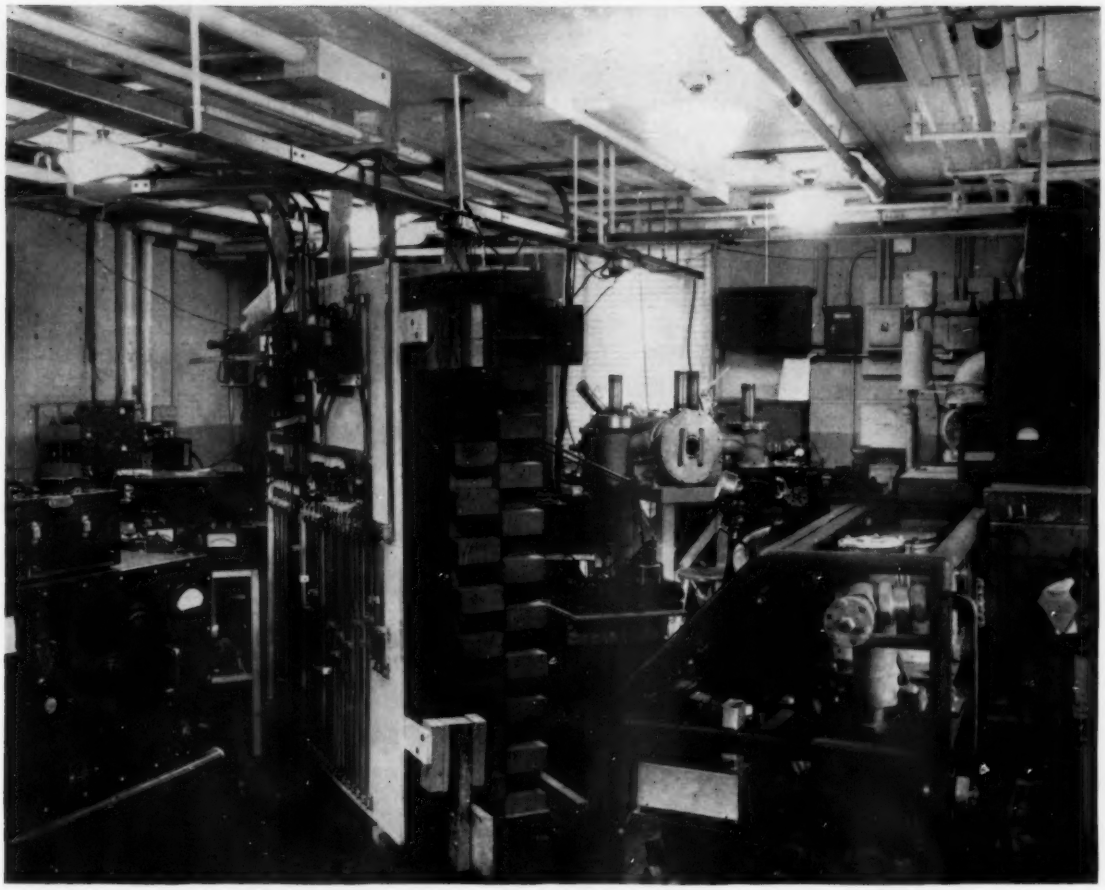


Fig. 1. View of a physics laboratory set up for a nuclear moments experiment. Floor construction, floor and wall surfacing, ventilation, all are important in planning these structures because of heavy floor loads and possible contamination

These Problems Soon Will Face Plant Engineers—

Planning the Radioactivity Laboratory

By JOHN M. RUDDY, Chief Engineer, Architectural Planning Div., Brookhaven National Laboratory

PLANNING AND ENGINEERING of radioactivity laboratories should first consider in what category they fall, such as: school, material or quality control, research and development, or fundamental research. This is necessary in order to properly evaluate and project past experience to new projects by types. Second, the layout and construction of the facilities should be based on an exhaustive examination of the effect of the various special laboratory functions on all of the standard criteria for building. (12, 13, 16, 33.)[1] Of necessity, the finished laboratories will reflect the methods and personalities of the staff for which it is first designed as well as their program as envisioned during the preliminary stage. Those responsible for overall planning should keep this latter in mind and seek the maximum flexibility reasonably obtainable in order to provide for future changes of program.

In addition to the general considerations outlined above, those laboratories which must handle radioactive materials must be planned to safely control the two major effects of the presence of radioactive materials. (5, 7, 8, 21, 37.) The first is the effect of the contamination of the air, surfaces, and wastes such as water, resulting from ordinary careful experimental manipulations as well as by accidents ("spills"). The second is the effect of radiated energy and particles such as alpha particles and neutrons or beta, gamma, and "X" rays on people and sensitive instruments which must, therefore, be shielded. For either effect the magnitude of the planning problem is defined by both the kind and the quantity of radioactive substances.

The kind of radioactive substances to be used will affect planning for contamination control because some materials spread and penetrate less, and are easier to clean up than others. More importantly, some radioactive matter (isotopes) weakens (decays) by itself to a safe level in a few days

[1] These numbers refer to the numbers in the bibliography published at end of article.

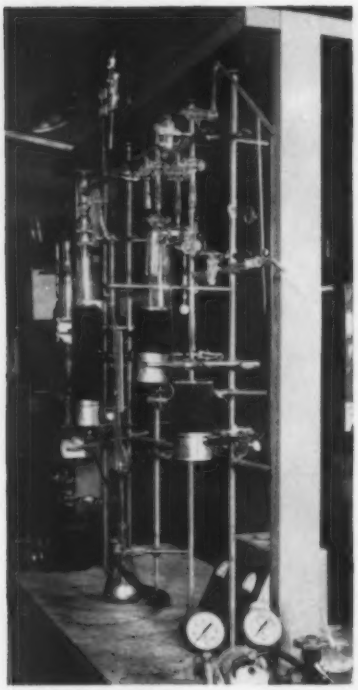


Fig. 2. Lab experiment in tracer work set up in a radioactive biological lab

or weeks while others take years and even thousands of years to become safely degenerated. Radioactive material affects shielding problems because each type emits radiation or particles at different energy levels, from a few thousand electron volts (ev) to millions of electron volts (mev), and one or more types of radiation or particles. A careful survey should be made of the probable type of materials that will be used and then their relative hazards should be evaluated against a table such as Table I (this table is not exhaustive). (10, 24, 36.)

Effect of bulk on radioactive control and cleanup is the usual one of handling large quantities and the effect on shielding thickness decreases proportionally (non-linearly) as quantities become greater. The quantity of a radioactive material is measured in "curies" (one curie being 3.7×10^{10} disintegrations per second) even though a particular "curie" could be concentrated in a gram or diluted in a ton of substance. A definition of laboratories by "level" of operation can be made by dividing them into five groups as follows: 1. ordinary, 2. tracer level, 3. semi-hot, 4. hot, and 5. multi-curie. This assumes the general range of curies of radioactivity to total quantity and types of material in the moderately hazardous group (Group II). Slightly hazardous materials (Group I) will usually decrease the "level" of operation while the very hazardous (Group III) will increase it.

Less than micro curie quantities can be used in an ordinary laboratory with standard aseptic type techniques on such experiments for example as those requiring the counting of beta emitters.

One micro curie to one milli-curie quantities may be used in "tracer-level" laboratories such as those needed for counting gamma activity or for process tracer work. (22.)

One milli-curie to one curie quantities would be used in a laboratory defined as "semi-hot" where for instance such operations as minor isotope-dilution, high level C_{14} or therapeutic work could be done. (1.)

One curie to one hundred curies of radioactive materials requires the use of a "hot" laboratory with extreme control and with remote operations and handling. (15,38.)

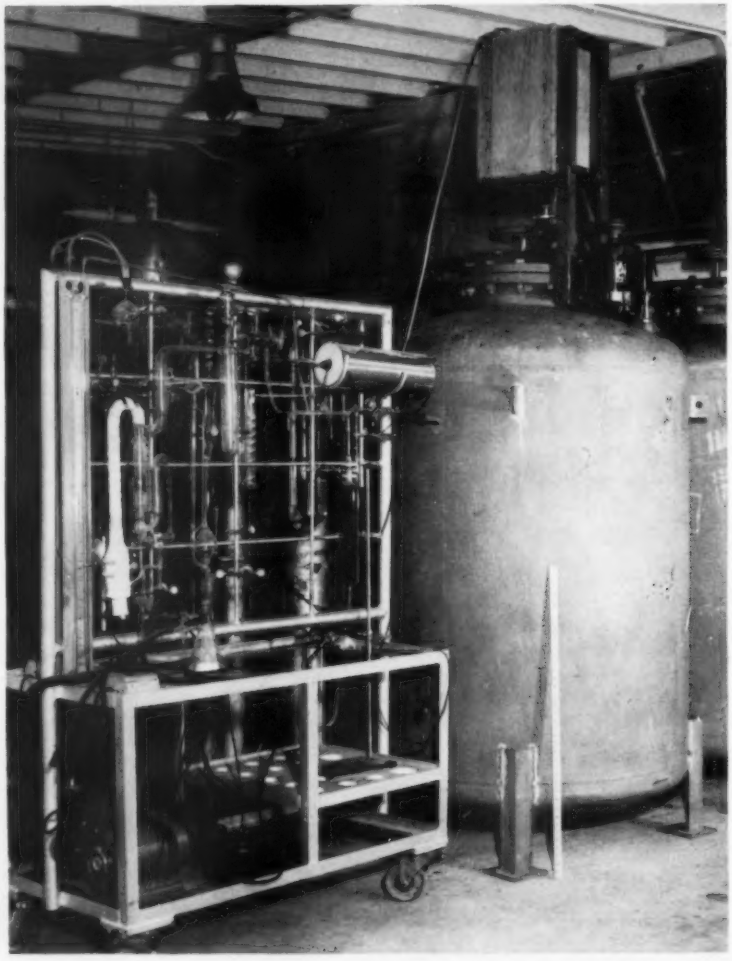
Over one hundred curies either actual or in machine-made radiation effect would be used in a multi-curie laboratory. The amounts can run into several thousands of curies now and possibly millions in the future. These should be considered as separate special facilities.

The impact of radioactivity on laboratories dealing in the physical sciences is generally more inclusive in chemical laboratories than in those for physics and engineering. The nature of chemistry experiments with their open liquids, dissolving manipulations, vapor and gas producing reactions, together with involved material transfers greatly enhances the chance of contamination.

In "tracer-level" and "semi-hot" laboratories special hood, storage, plus gas, liquid and solid waste disposal facilities should be planned, together with easily decontaminable surfaces, provision for some shielding, and extraordinary ventilation design to prevent contamination of the room air. (2, 4, 11, 14, 17, 18, 19, 23, 28, 29, 30.)

"Hot" laboratories and those using

Fig. 3. These are high pressure tanks in a chemistry lab for a hydrogen experiment



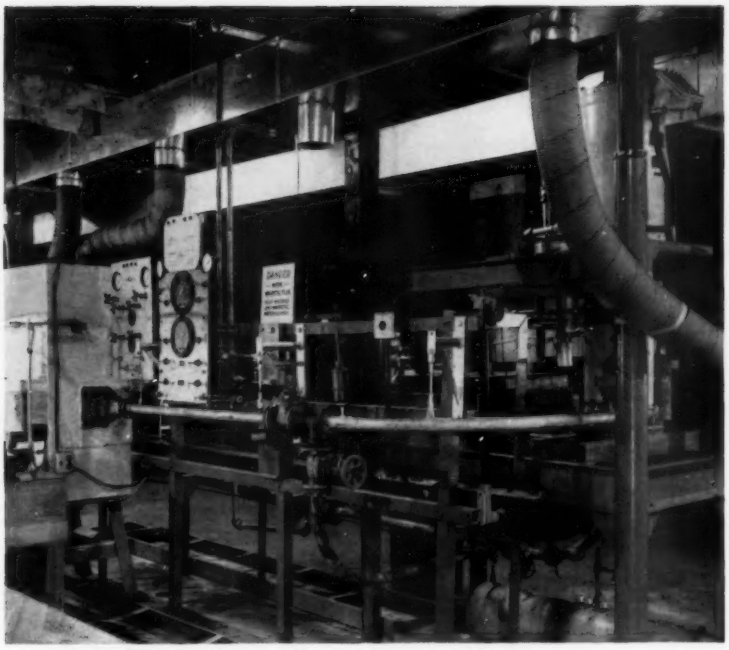


Fig. 4. This is a hot lab for reactor engineering set up for a mercury experiment

even higher levels of radiation materials require in addition to the above, such things as complete enclosure, heavily shielded caves and remote control devices. (20.) Physics and engineering laboratories, on the other hand, except when they use chemistry type experiments usually are dealing with radioactive materials in the solid or contained state or radiation from canned sources or machines (such as X-ray, reactor, or accelerator beams). Special requirements of the latter, therefore, tend to revolve around shielding and equipment handling and servicing problems. (9.)

Effect of the use of radioactive substances in laboratories for the life sciences is about the same for both biology and medical suites. Generally speaking, the work would be with radioisotope tracers, therapeutic doses or ionizing radiation from canned radiation sources or machines such as high energy X-ray equipment. (6,32.)

"Tracer-level" and "semi-hot" laboratories require approximately the same design and layout techniques as do chemical laboratories in the same class including usual consideration of glass and dishwashing methods and waste control. In addition, animal cages and rooms or pens and their washing must consider radioactive as well as biological contamination. Usually some special organic waste storage containers are required such as urine holdup tanks which permit the self-degeneration of radioisotopes in the stored fluids.

All types of laboratories require the most modern flexible layout and provision of services and furniture that is economically feasible together with special treatment of the following basic components: layout, structure, surfaces, furniture, air handling and treatment, waste piping and control; and some additional features such as monitoring stations, shielding, waste holdup systems, counting rooms and isotope storage facilities.

Site layout is affected by the prevailing wind to assure maximum dispersal of air borne contamination in the least harmful direction and by the slope of surface and ground water flow to minimize spread of contamination to sensitive areas. Building layout should permit entry first into "cold" areas with level of use of radioactive materials progressing through "tracer," "semi-hot" to the areas of greatest "level" of radioactivity. Occasionally consideration of national security must be planned in the building. At all times flexibility and modular layout should be prime design criteria.

Building structure must be designed with the shielding and lead "hot" material container loads in mind. For "tracer-level" and "semi-hot" laboratories the general floor load should be approximately 150 lb per sq ft with provision for at least one 2000-lb load over 8 sq ft at one time in any corridor or laboratory. For "hot" laboratories the general design floor load should be 400 to 600 lb per sq ft with provisions for moving and placing 2 ton concentrated (over about 4 sq ft) loads. Most other higher "level" facilities require completely special study.

Surfaces of walls and ceilings should be smooth and decontaminable with detergents and, at times, with acids. (25, 27.) Floors should be of asphalt or plastic tiles on heavy paper and with an added special chemically corrosion resistant paint in most areas. This permits more satisfactory cleaning (decontamination) techniques or replacement when surface decontamination fails. Strippable paints or films can be used, also in particular areas.

Furniture, if possible, should be

Table I. Relative radiotoxicity of various materials classified in three groups

Group I: Slightly Hazardous		
Sodium 24	Manganese 52	Krypton 85
Potassium 42	Copper 64	Mercury 197
	Arsenic 76, 77	
Group II: Moderately Hazardous		
Hydrogen 3	Iron 59	Barium 140
Carbon 14	Cobalt 60	Lanthanum 140
Sodium 22	Strontium 89	Cerium 141
Phosphorus 32	Niobium 95	Praseodymium 143
Sulphur 35	Ruthenium 103, 106	Neodymium 147
Chlorine 36	Tellurium 127, 129	Gold 198, 199
Manganese 54	Iodine 131	Mercury 203, 205
	Cesium 137	
Group III: Very Hazardous		
Calcium 45	Yttrium 91	Cerium 144
Iron 55	Zirconium 95	Promethium 147
Strontium 90		Bismuth 210

Radiotoxicity of various substances when taken internally depends on the following factors: 1. degree of selective localization within the body; 2. biological rate of elimination from the body; 3. rapidity of degeneration (half-life); 4. energy and type of radiations. (35).

standardized and modular with chemical proof finish and tops, except that physics and engineering laboratories can generally use ordinary shop type furniture.. Fume hoods should be of the radio-chemical type preferably with air foil entrances and generally strong enough to hold a 1000 to 1500 lb lead block shielding load; or in "hot" laboratories to hold 1½ to 2 tons of shielding. Hood services must be arranged for control from the outside and for lighting from the exterior. The application of a strippable coating to the inside should be considered.

Radioactive materials affect air handling in several major ways. Basically the supply and exhaust system should insure a general movement of air from the "cold" area through the "tracer" and "semi-hot" rooms to the area of highest "level" of radioactivity. The air should be filtered in the usual commercial method at the intakes but all coils and other equipment in ducts should be corrosion-proof to avoid build up and spread of dirt to the laboratories. Systems should be once-through except for segregated office type areas. Generally exhaust fans should be as near the above roof level discharge as possible. This should always be true for fume hood exhausts. Fume hoods should preferably each have their own exhaust fan, as common ducts enhance cross contamination, but with interlock switches and air supply tied in to prevent back drafts in any hood.

Flow of air through any laboratory should be constant regardless of the position of any hood sash. Hoods should be located in the room away from doors or windows to minimize back drafts. The general air exhaust of "tracer-level" or "semi-hot" laboratories may require absolute (AEC type) filters so that the original layout should provide space and possibly extra electric power for this purpose. "Hot" laboratory fume hood and cave exhausts usually require filtering through absolute filters.

In spite of the fact that once-through systems and hood air volume requirements place a heavy burden on air conditioning, such systems are by now a practical necessity for all of the usual reasons plus the two following: 1. experimental techniques and instrumentation have reached a degree of precision that requires standardization of ambient conditions as to temperature and humidity to permit advanced results and 2. standard experimental conditions of all variables except the one under consideration are required to allow reasonable comparison of results with other experiments in the same category.

Waste piping in all types of laboratories except physics and engineering (non-chemical) from laboratory sinks should be drained in chemical-proof piping to a neutralizing arrangement and proportional sampling equipment. At this point of discharge in "tracer-level" and "semi-hot" laboratories the waste can be normally discharged to the sanitary sewer provided there are valves and at least two holdup tanks which will permit holding the effluent at will in special cases such as "spill" cleanups. (34.)

In "hot" laboratories, on the other hand, the waste should always be held up at this point with the tanks arranged to permit pumping or draining either into the sewer or ino a tank truck for other disposal. Careful consideration should be given to planning a drainage system which will allow the discharge of liquid wastes known to be uncontaminated (such as laboratory cooling and aspirator water) into drains other than the special laboratory sink waste system to prevent unnecessary overloads on sampling and holdup equipment.

On the other hand, janitors' slop sinks should be on the laboratory waste system to control contamination. In addition, some screening or straining of wastes from biology and medical laboratories is required to prevent clogging of neutralizing and sampling equipment from organic materials.

Besides the effect that handling radioactive materials has on most of the various building components, some or all of the following special features must be considered: 1. health physics stations, 2. shielding, 3. special locker-washup suites, 4. counting room, 5. isotope storage.

A health physics station in a "tracer-level" laboratory would probably be only a board to hold film badges and exposure pencils for the people involved and with a control system to back it up. In addition, in "semi-hot"

(Continued on page 174)

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From a 20 per cent "Assist" to an 80 per cent "Push"

MH Modernizes at S. D. Warren

An increase in production machinery and capacity meant getting the most use out of available space . . . Wise selection and use of materials handling equipment proved to be the answer

By **LESLIE S. PEARSON**, Industrial Engineer, S. D. Warren Co., Cumberland Mills, Maine

WITH A PLANT covering 216 acres, 52 of them under roof, our company, paper manufacturers, faced a materials handling problem at Cumberland Mills. The plant comprises a paper mill, a bleach manufacturing unit, and a pulp mill with a daily capacity of 220 tons of soda pulp and 55 tons of long-fibered pulp.

Rapid expansion had required plant layout changes that sometimes necessarily created obstacles to efficient materials handling.

Faced with still further increases in production machinery and capacity, our engineers made a realistic appraisal of the plant and its requirements. It became apparent that the solution to the problem did not necessarily lie in making major capital investment structural changes, but in providing a system that could function within available facilities.

Raw materials storage was found to be in a particularly unbalanced condition. Because expansion of production facilities had been taking top priority, storage was located in many different areas, some of them a long way from point of usage.

Materials were being stored in bays that were not easily accessible, or were tucked away in upstairs spaces where our too-small elevator was required for handling. Some of the storage spaces did not have optimum floor loading strength; others had inadequate head room. Structural uprights which had been erected as part of the installation of new production equipment had created bays and storage areas of various shapes and sizes.

What Study Showed

The engineers' study showed that the best approach would be the selection of new and improved centrally-controlled methods and materials handling equipment—equipment that would fit the needs of the plant and streamline the materials handling operation, with central controls to coordinate and support the program.

The company selected a variety of Lewis-Shepard trucks and tractors, each modified to perform a certain specific function connected with the handling of the commodities involved in the manufacture of paper.

One of the operations carefully analyzed was the handling of raw and semi-processed pulp. Raw and semi-processed pulp was originally handled by manpower with an assist from mechanical means to the extent of approximately 20 per cent. It is now handled mechanically to an extent exceeding 80 per cent. In the improved operation, L-S Jack Tractors and electric trucks support new conveyor systems from other floor levels. The tractors enable the operator to maneuver a "train" of carts under conveyor chutes to be loaded with the pulp. See Fig. 4.

The filled carts are moved by the tractor to yarding areas for delivery to the pulp beaters for further processing. Here, electric fork trucks equipped with specially-designed hydraulic rotating carriages lift each cart, lock it into place on the forks and carry it to the beater. The rotating carriage turns the cart completely upside-down

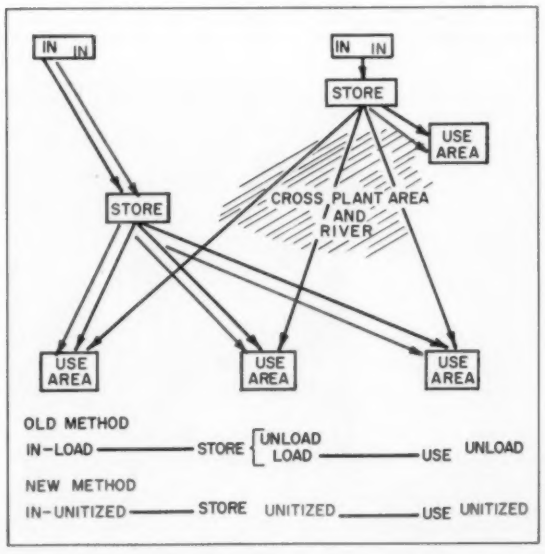

Fig. 1. Raw material flow chart of old and new methods

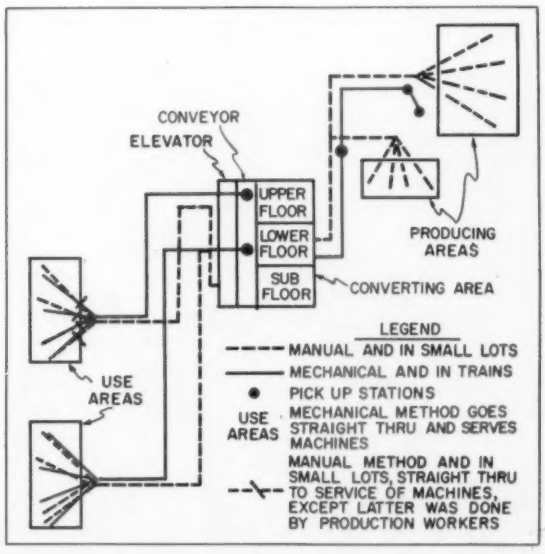
CONVEYOR ELEVATOR
UPPER FLOOR
LOWER FLOOR
SUB FLOOR
PRODUCING AREAS
CONVERTING AREA
USE AREAS
LEGEND
MANUAL AND IN SMALL LOTS
MECHANICAL AND IN TRAINS
PICK UP STATIONS
USE AREAS
MECHANICAL METHOD GOES STRAIGHT THRU AND SERVES MACHINES
MANUAL METHOD AND IN SMALL LOTS, STRAIGHT THRU TO SERVICE OF MACHINES, EXCEPT LATTER WAS DONE BY PRODUCTION WORKERS

Fig. 2. Semi-raw material flow is now simplified, controlled

1- 275 lb TEST DOUBLE WALL CORRUGATED DECK BOARD
2-FEET MADE FROM WASTE WOOD
3-UNDER CLEARANCE 1" ANTI-FRICTION FOR LOW COST
4-ENTRY— FOUR WAY
5-ASSEMBLY, GLUE AND STAPLES
6-CHISEL FORK OPERATION, LOW STABILITY, DECK BOARD SERVES PRIMARILY AS TIE MEDIA FOR FEET WHICH CARRY WEIGHT. MINIMUM COST FOR EXPENDABLE PURPOSES, USE OF SLEEVES ALLOWS DUAL PURPOSE USE OF CHISEL FORKS

Fig. 3. Drawing of skin pallet shows simplicity of paper, wood construction

to empty its contents into the beater.

To improve the feeding of waste paper to shredders, a fork truck was fitted with a 'dozer-like blade. As shown in Fig. 6, one man can handle this job, and the increase in efficiency has been estimated at 40 per cent.

In conjunction with the waste paper handling operation, which brings paper from other mill departments back to the re-processing area, pick-up stations were assigned along designated routes of travel in each department for a train of carts pulled by a tractor. During the entire 24-hour operating day at Warren, these trains travel the route, picking up full cars of scrap paper, carrying them to the re-processing area, and returning with empty cars for spotting at their respective pick-up stations.

Handling of finished paper has also come in for its share of improvement. The use of disposable "skin" pallets, as shown in Fig. 3, has cut costs considerably in this area. The pallet itself is a piece of selected corrugated cardboard, with 1-in.-thick wood blocks glued and stapled to the underside.

The load, which merely rests on the pallet, rather than being strapped or taped to it, is glue-locked together. In the warehouse, the pallets are stored in racks, on regular open face pallets. When ready to load paper into a rail car, the fork trucks chisel the entire skin pallet load from the wooden storage pallet, carry it to the car, and set it in place.

Handling of these minimum-clearance pallets has been facilitated by trucks with chisel forks, which will slide under the pallets with a minimum of difficulty.

Fully adjustable in shelf height, storage racks added some versatility to equipping some of the electric lift the cramped storage areas. These racks, also supplied by Lewis-Shepard, provide flexibility by allowing standardization of loads and re-assignment of space as stock conditions change.

Immediate plant needs required an initial investment of $52,000 in materials handling equipment. Results of this investment were seen clearly in the first year of operation when savings attributable to the new handling techniques amounted to more than $140,000.

Other benefits from the correction of material handling problems are less obvious, but have had their effect on the plant's manpower and productive capacities. For example, each of the three models of trucks used carries its operator aboard—reducing operator fatigue. One of the truck models, the Ready Power truck, is powered by a gasoline engine-driven generator, which in turn provides the power for the electric drive motors. This feature is of particular advantage in Warren's 24-hour operation, since it does not require battery recharging at frequent intervals.

Those trucks that do require battery recharging are handled efficiently in the maintenance shop area, and are serviced by chargers hung on the maintenance shop wall.

Four additional benefits have resulted from the improvements in materials handling at our plant: 1. Improved personnel utilization. Workers have been trained in the operations of the new methods and have been upgraded from laborers to more skilled production workers. Those displaced by the more efficient handling methods went into production activities, adding to plant capacity. 2. Improved utilization of handicapped employees. Fork lift equipment has made it possible for persons with certain physical disabilities to perform duties comparable to these performed by employees not physically handicapped. 3. Mechanical methods and techniques have brought about standard practices. 4. Introduction of the new handling devices has permitted isolating them costwise, into individual groups, with a resultant stabilization of cost procedures and as well as costs themselves.

Fig. 4. Operator spots "train" under conveyor chute to fill chart with pulp

Fig. 5. Cart of semi-processed pulp at beater, prior to rotation for dumping

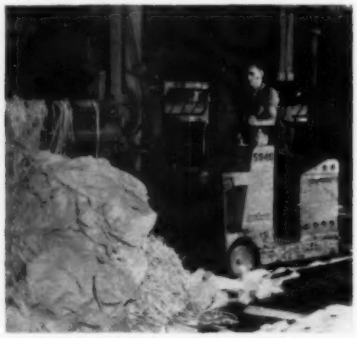

Fig. 6. Operator fills paper shredder using 'dozer blade mounted on truck

Fig. 7. Pallets of finished paper are stored in adjustable warehouse racks

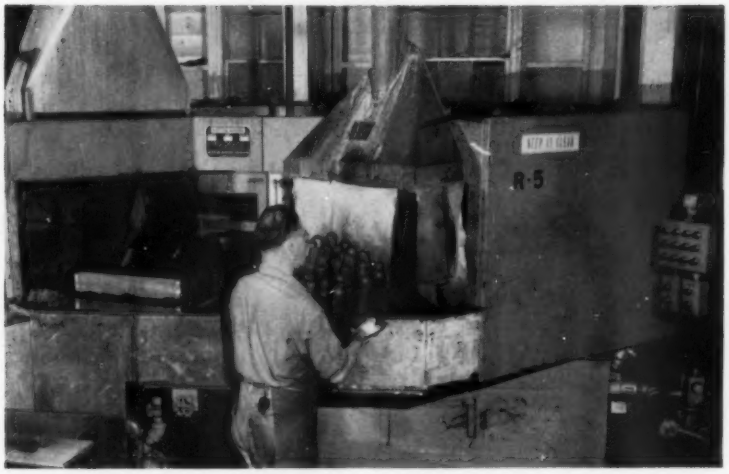

Fig. 1. Here's one idea that paid off in streamlining operations as well as saving production costs. Rotary washer allows one person to handle all the operations

Ideas Help Cut Corners

Presteel Finds Easier Ways to Do It

By L. SCHMIDT, Works Manager, Worcester Pressed Steel Co.

STREAMLINED PLANT operations can mean thousands of dollars in savings—in addition to more efficient production and improved customer service.

Some of the specific gains in our streamlining program were made possible by changes in the physical plant and its layout. An example of this is where we enlarged one doorway to move presses from room to room. Before, it was necessary to set the presses on their side in order to get them through the doorway. With the enlarged doorway, the extra time spent in maneuvering the presses has been eliminated.

By rearranging production line layouts, which meant moving walls and even stairways, we have been able to shorten production lines and facilitate materials handling.

After surveying production facilities, we came up with a number of innovations which brought about more efficient production. An example is the organization of three sections of the plant into die setter supply areas. Supplies are now kept orderly and a system has been devised for storage of the dies.

For portability, we have presses on mounts and casters, which can be easily connected to the overhead bus duct. We have even put our induction annealing unit on casters.

Previously, it was necessary to have an attendant at each end of a washing machine; one to feed the materials, and the other at the outlet, to receive the material as it left the machine. This situation was simplified, and costs reduced, by buying a rotary washer, thus allowing one person to handle both input and outlet operations.

Formerly, we had trouble with the wooden floors in the pickling house. The wooden floor would be eaten away within six months by hydrochloric and nitric acid. To correct this maintenance problem, we dug out an area around the pickling tanks and filled in with gravel. The gravel pieces are about ¾ in. in diameter. This crushed stone was then rolled with a lawn roller until it was sufficiently firm to permit easy walking and to accommodate wide-wheeled trucks. It is no longer necessary to replace the floor periodically because of acid attacks.

All other machine units in the plant were carefully studied and some modified or rebuilt to improve their role in the work flow. In several cases, the supplier or machine manufacturer was contacted and provided valuable information or assisted in modifying the machines.

Another factor that has been helpful in keeping the plant and methods in tune, has been the formation of a special research and development group. This group is continually engaged in looking for new materials, methods and devices for improving operations.

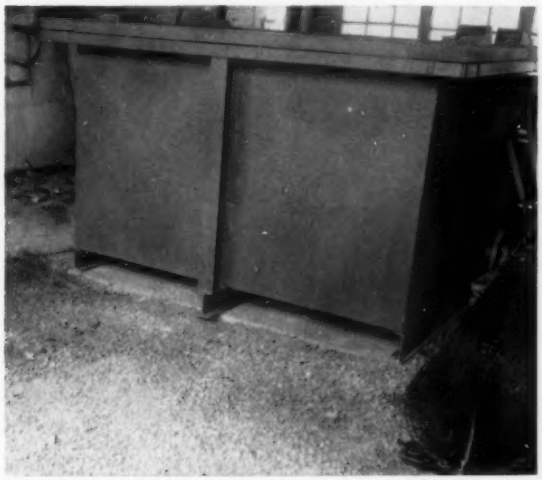

Fig. 2. Gravel has replaced the wooden floor in the plant's pickling department, eliminating need of repairing the floor

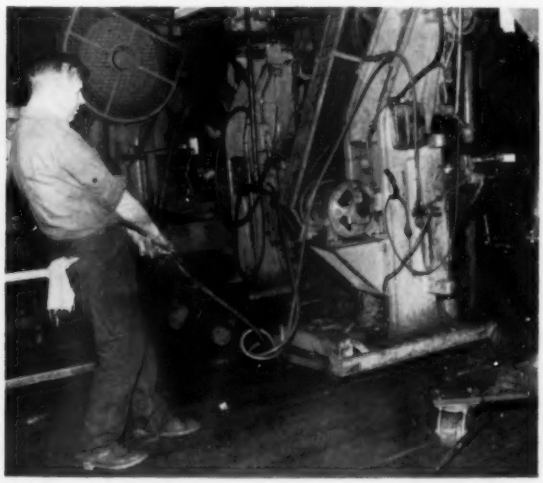

Fig. 3. Many of the plant's presses are equipped with casters for maneuverability in case of changes in the line

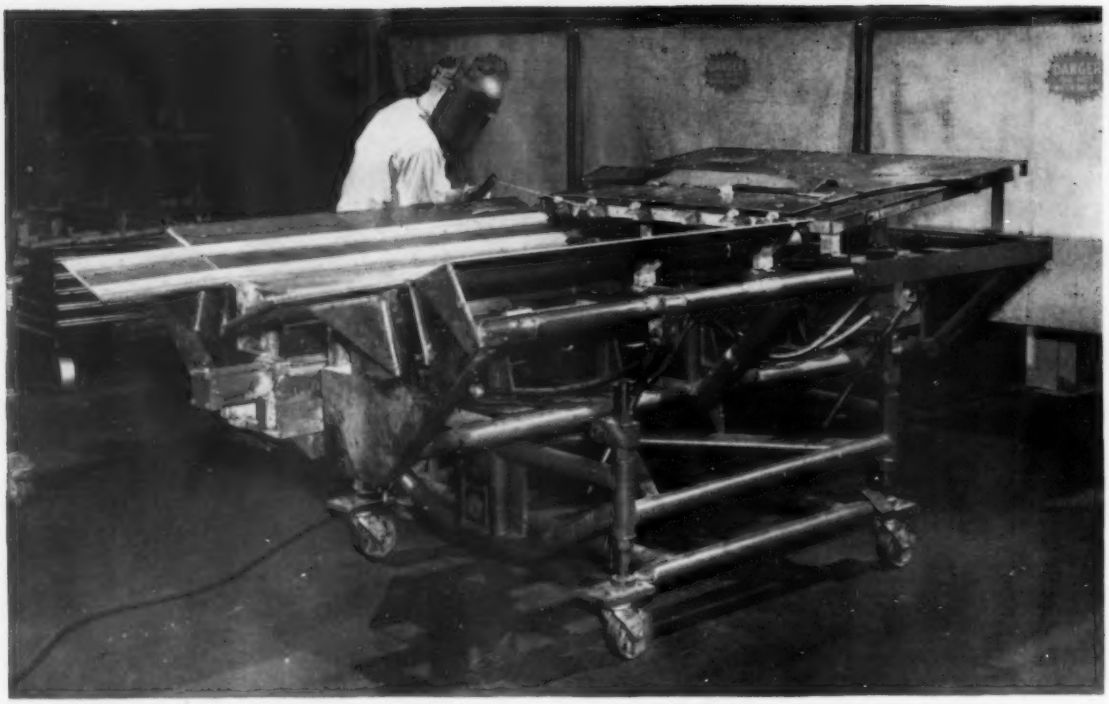

Fig. 1. Crews of skilled maintenance men construct the complex automation devices at Ford's new Cleveland stamping plant. A typical example of this type of equipment is the loader, above, which feeds metal sheets to the press lines

Automation Maintenance—

How Ford Designs and Services Its Automatic Equipment

INTRICATE AND complex automation devices at Ford Motor Company's new Cleveland stamping plant are the responsibility of a small group of men.

A staff of engineers, designers and experienced journeymen conceive, design, construct, test and maintain all this automation equipment in the plant. They form the automation department.

This department takes over when it is decided to automate a certain production process within the plant.

Ideas must come first and then the best method of handling a production phase is decided. The idea goes to designers who work out such details as clearances and dimensions and also to electrical engineers who design suitable circuits.

When designs have been approved they go to the construction shop of the automation department where the necessary parts are made or ordered for the finished piece of equipment.

When completed, the new devices are checked in the shop and then taken to production sites and installed. They are tested by the automation department under actual working conditions and any necessary changes are made before the equipment is finally turned over to the production crews.

Safety screens are attached and all built-in safety features thoroughly checked to make certain that everything possible has been done to eliminate accidents.

The automation department's preventive maintenance program begins immediately after the devices have been installed. In addition to regular visual checks, a log book is kept of various vital parts so that they may be removed and repaired prior to a failure that would result in production line stoppage.

An automation maintenance crib, with spare parts and necessary material to maintain the equipment is located in a central area in the plant. Tools, workbenches and cabinets, containing readily available parts, are located on the production line.

Maintenance crews of the automation department make a daily check of the equipment. Every piece of automation equipment on the line is given a visual check and the parts that need further repair are reported on a daily

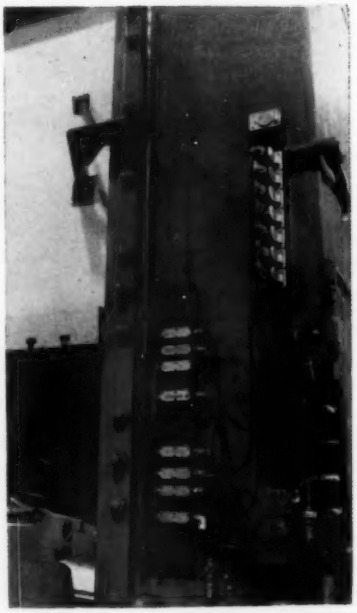

Fig. 2. Presses are cycled by these dropcam electric controls to insure split-second timing needed for fast operations

report sheet. Loose bolts, hoses, switches, etc., are checked at the end of each day and necessary adjustments made.

Usually, when a press line is shut down after completion of a run and before dies are set in place for a different part, all the automation equipment is pulled off the line. This will include the loader, conveyors, side-arm extractors, turn-over units and parallelogram loaders.

This equipment is steam-cleaned, parts checked for wear and necessary replacements made. After this, the equipment is greased, repainted and readied to go back on the production line.

Rule: Simplify and Standardize

To assist the maintenance crew servicing this equipment, all new operations have been designed to simplify automatic controls, parts are standardized for complex transfer machines and ways sought to ease power requirements of handling devices while increasing the speed of such units.

Wherever possible automation devices have been standardized. This move reduces the number of parts needed to properly maintain vastly different types of equipment. Loaders, extractors, turn-over units and other devices that move the heavy automobile body stampings have interchangeable parts.

A main step in the standardization program was the installation of two-to-one power drive units in most transfer machines. A unit from one automatic device is readily interchangeable with that from another.

The new power units feature a short cylinder stroke which propels transfer machines—mounted on movable racks—twice the distance of the stroke, and, thus, at double the speed. Only one-half as much air volume as normally required is used for the short stroke.

Drop-cam electric controls on the presses insure split-second timing needed for the high speed automatic devices. All automation is wired to a press-control circuit and a single downward sweep by a driver arm sends all units into action at precisely the correct moment. Employees guide the stampings, adjusting pieces where necessary. If a device is not in the correct position at the proper time the press will instantly stop automatically.

Transfer devices also have been improved markedly at the plant. The steel arms and fingers of the extractors have been mounted on wheels, turnover devices invert bulky body parts as easily as pancakes, and new parallel-

LINE MAINTENANCE PERSONNEL DUTIES

LINES	RESPONSIBILITIES	SHIFTS
2 - 3 1 Man	Maintain lines 2 and 3. Repair Ross valves. Each valve to be tagged OK and signed by maintenance man.	2 - 3
4 - 5 1 Man	Repair rubber rollers. Maintain lines 4 and 5.	2 - 3
8 - 9 1 Man	Repair compound spray guns. Each gun to be tagged OK and signed by maintenance man. Maintain lines 8 and 9.	2 - 3
10 1 Man	Maintain line 10. Repair, replace and make up new air hoses on request.	2 - 3
11 1 Man	Maintain line 11. Repair filters, regulators, oiler gages. All items to be tagged OK and signed by maintenance man.	2 - 3
12 - 13 14 - 15 1 Man	Maintain lines 12, 13, 14, and 15. Repair and replace conveyor belts on request. This man should have slate or clip board to note where he is working when away from stationed area.	2 - 3
Roving Electrician. Location between 8 - 9 1 Man	On call for electrical repair on all lines. Responsible for repair and replacement of limit switches. All switches to be checked, approved and signed by maintenance man. This man should have slate or clip board at bench to note where he is working when away from stationed area.	2 - 3
Assembly Area 1 Man	Maintain assembly lines except Mercury rear floor pan automation. This man assigned work area to be centrally located. He will be responsible for maintenance of all Dirkes equipment, including guns, pumps, etc. This man to have a slate or clip board to note where he is working.	2 - 3
Mercury Rear Floor Pan 2 Men	Maintain this line.	2
Small Press 2 Men	Maintain all equipment in small press area and N line.	2 - 3
Leader 1 Man	To cover all major press areas.	2 - 3
1 Man	Repair and maintain cylinders. Each cylinder to be tagged OK and signed by maintenance man.	2 - 3
Main Crib 1 Man	Repair and maintain extractor jaws. This man is responsible for keeping records of all jaws. Check lines for proper operation of jaws. Check and maintain replacements on lines. Write A.V.O's (Avoid Verbal Orders) to maintenance foreman when repairs or replacements are necessary. All jaws to be tagged OK and signed by this man. Build, repair and maintain drop cams on presses on a routine inspection basis. Check plates for galling and wear. Write A.V.O's to foreman when replacements are necessary.	2

****

1st Shift

16	Maintenance men
4	Construction men
20	Total

2nd Shift

14	Maintenance men - Major lines, small press and assembly areas.
1	Maintenance man - Extractor jaw repair.
1	Maintenance man - Drop cams.
1	Maintenance man - Cylinder repair.
21	Construction men
38	Total

3rd Shift

14	Maintenance men
1	Cylinder repairman
17	Construction men
32	Total

Fig. 3. Right: These instructions outline each maintenance man's line responsibilities along with other duties

ogram loaders set stampings in presses and welding machines with amazing accuracy.

Side-arm extractors have adjustable supporting columns which make them usable on all stampings produced in the plant. The portable mountings make it comparatively simple to move the extractors from one line to another. Maintenance is simplified by wheeling the extractors into the automation department for repairs.

Conveyor belts are also mounted on portable frames and can serve different production lines.

To keep a closer check on the automation equipment on the line, one or two men will be assigned to from one to four production lines. It will be his responsibility to inspect and make necessary repairs according to his instructions regarding that line.

The illustration, Fig. 3, showing the various duties for the lines best explains this. Note that each man is also responsible for repairing a particular piece of equipment pulled off the lines for servicing. One man is responsible for repairs to compound spray guns; another, repair and replacement of limit switches; another, repair and replacement of conveyor belts on request, or repair, replacement of hoses on request.

At the end of each shift, the man responsible for the line will fill in the "Daily Line Performance Record" report. This report is filled out for each line in service that day. Any work that needs attention is placed on the "Daily Line Up" report, which gives a description of the work that should be done on the various production lines. See Fig. 5.

All automation units in the plant are easily identified as they are painted bright green against the normally gray background of production machinery. All moving parts of the automatic devices are painted yellow as a safety precaution.

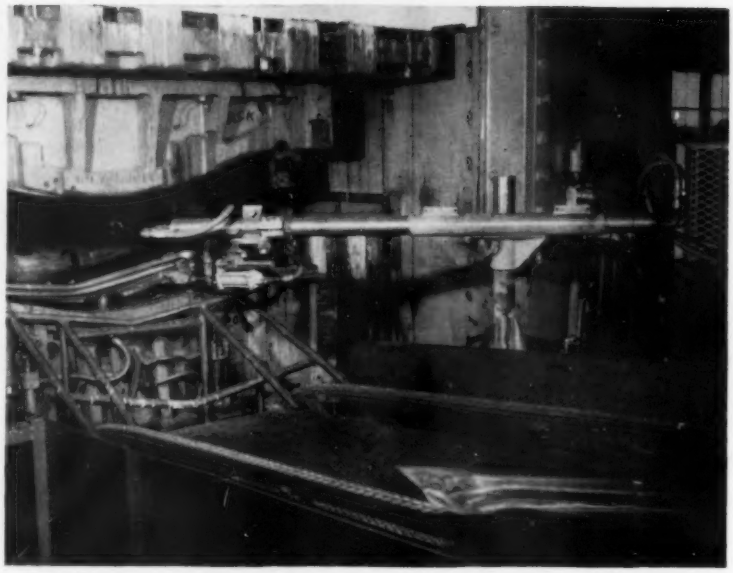

Fig. 4. Part, lower right, has just been extracted from the press by the side-arm extractor. This automation equipment was standardized for easy maintenance

CLEVELAND STAMPING PLANT

DAILY LINE UP

DATE 5-22-56

DEPT. 4019

FOREMAN R. Gaynor

DESCRIPTION OF WORK TO BE DONE

AUTOMATION SHIFT LOG	COMMENTS
1. Cylinder which elevates 10-B-1 Loader needs to be changed.	Leading air past piston, making it very hard to regulate
2. Install replacement cylinder in 11-4 extractor whenever time permits.	
3. Roller and bracket behind 11-2 fell off and down chute.	Put new one on at 3:30 p.m. (On Auto Bench)
4. Install new return pump on Dirkes equipment on line 9 when line shuts down at 3:30 p.m.	Pump and new hose are on line.
5.	
12.	

FOREMAN 1st Shift _____

2nd Shift _____

3rd Shift _____

Fig. 5. Information from each maintenance man's daily report record is placed on Daily Line Up report of work to be done, and scheduled for early repairs

A typical example of the amount of time and effort men in the automation department will devote to a particular piece of equipment can be seen in the evolution of the side-arm extractor presently being used.

Developed two years ago by the automation department, the new extractor has more than proven its worth, and is finding its place in the production equipment at the plant.

Prior to its development, a pendulum type extractor was in use. The pendulum units presented many problems and when the automation department attacked these problems, the result was the development of the present unit.

The pendulum unit was mounted on a bracket high on the back of the press. It represented a large mass of equipment hung on a small mounting area and was a troublesome unit for maintenance which was one important factor in ultimately discarding it. If maintenance was required, it meant wheeling ladders into position and disassembling the extractor from the mounting bracket, lowering it by crane and attempting the repairs.

A second problem with the pendulum was that it did not present a smooth motion and on many occasions its timing was such that the extractor jaws would actually be caught inside the die.

Still a third item which was annoying to an automation group, which works primarily in the study of smooth and meaningful motion, was that the extractor as a pendulum would swing in an arc. Hence, in the swinging motion, the extractor after pulling the

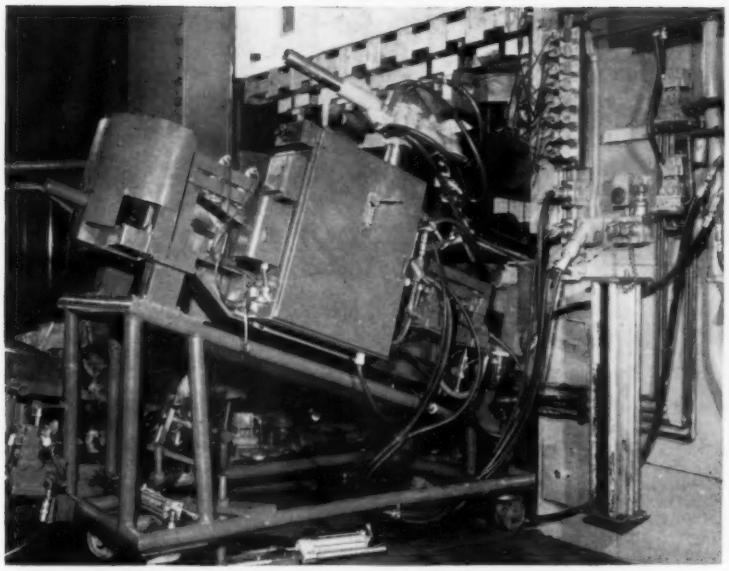

Fig. 6. This is another view of a side-arm extractor. These units are mounted on wheels to give them flexibility for possible changes in production operations

panel from the press, would drop it a considerable distance to the conveyor. During such a drop, there was no control of the panel.

The new side arm extractor is floor-mounted. Actually, it is mounted on casters so that it can be wheeled into position and then is fastened to a bolster plate to give it rigidity. It is then plugged in and begins its operations. Maintenance on the unit can be accomplished while it is in position and certain adjustments can be made while the extractor continues operation.

One of the most important features of the new unit is that it cannot start its motion to the extracting position until the press is closed. This prevents the extractor jaws from ever being caught in the die. Damage to dies and to the extractor proper is thus eliminated.

The design of the unit is such that the extractor is halted in its motion at the end of the six foot stroke from the die. In case of a jaw failure, which prevents it from retracing, it would merely bump against the closed die, and no harm would be done.

The major problem to be overcome in the design of the unit was shock. Since it is an air powered device, the rapid acceleration and deceleration required to produce the speed of the operation was tremendously wearing on the air cylinder which had to cushion the shock.

The question facing the automation engineers, then, was how to use a quick exhaust valve and yet retain a cushion so that the unit would operate without the tremendous banging that would result from an uncontrolled quick exhaust. They recognized also, that maintaining a cushion would slow the extractor so that the essential element of speed, which must be an inherent factor of automation, would be lost. The answer, they decided, was in the valve.

The department waded through all available valve catalogs until they found one they could modify with a diaphragm arrangement. This unit now permits the necessary quick exhaust and yet provides a by-pass for the quick exhaust that maintains just enough air pressure to provide a cushion.

The first extractor was powered with a gear and rack through the air cylinder of the compressed air circuit which provided a 2 to 1 ratio or 2 in. of extractor travel to 1 in. of cylinder travel. This 2 to 1 ratio is used now to provide 6 ft of extractor travel based on a 36 in. cylinder.

Units which will be placed on the lines for the production of the 1957 body parts are being modified to operate on a 4 to 1 ratio. Since a cylinder can move at a set optimum, the added ratio and additional extractor travel will add to the speed of extraction.

Perhaps one of the most unique developments of the extractor which will be installed at the plant soon will involve reversing the movement of the extractor so that it will become an "inserter". This adaptation will be used on one side of the press to place parts on the die, and a unit on the back of the press will be employed for its conventional use of extraction.

Fig. 7. View of one of the 22 major press lines. All automation equipment on lines is serviced by automation section

Fig. 8. Conveyors, transfer devices, also serviced by automation staff, link welding operation, above, with presses

Coordinating Plant Instrumentation—

Installing Major Project Calls for Careful Planning, Scheduling

By **CHESTER S. BEARD**, Research & Development Engineer, Foster Engineering Co.

DESIGN AND CONSTRUCTION of a new manufacturing unit or complete plant must be preceded by general discussions which progressively become more specific. This is also the case with major revision projects. Upon the basis of an agreement between various cooperative "special service" men or groups such as electrical, structural, instrument, and others, an overall set of general specifications must be developed as a guide.

With this guide and the specific requirements of the project as represented by the process flow sheets and piping and instrument diagrams, each special service may begin to contribute to the progress of the entire integral picture. Previous articles in PLANT ENGINEERING have dealt with the organization of an instrument department and the considerations and decisions which precede the meetings that were just mentioned. In this article, we will show how instrumentation is specified and scheduled.

No matter which method of furnishing manpower may have been selected for this portion of the project, the steps are very similar.

System Specs

In the past, the preparation of instrument specifications consisted of setting up individual requirements for each type of instrument. This would include size and color of recorders, acceptable ranges, type of measuring unit and such details. Although this is still necessary, in a general way, the advent of control systems has deemphasized many of the details.

For example, it is difficult to specify the dimensions of a recorder when the more important consideration is its function within a graphic representation. Too specific dimension requirements might easily throw out the equipment of one manufacturer even though many more important characteristics of the equipment recommended it for selection. Certain pieces of equipment such as control valves, transmitters, pressure gages, primary flow elements and others can be evaluated by a specification which simplifies analysis required for selection at time of purchase.

The parameters set up for each characteristic of a piece of equipment should be broad enough to include all products available of reputable manufacturers. It should be made clear that alternates will be considered if the description offered is complete enough to evaluate the exceptions from the requested instrument. A form, Fig. 1, should be developed for each class of instrument.

The requirements as shown by each item or line in this form will determine the instrument for which a quotation is desired.

When the entire complement of instruments needed is actually a control *system* it is necessary to explain thoroughly the point desired. It is also helpful to submit an instrument diagram or piping and instrument diagram to show at least one approach to the problem. Each instrument company that quotes may have a slightly

Fig. 1. Forms like this should be developed for each class of instrument in project

Instrument No. — Mark No. — Item No.						
Service						
Commodity						
Operating Conditions	Flowing Temp F					
	Max. Working Press. PSIG					
	Operating Press. PSIG					
	Spec. Grav. @ 60 F (Air-Water)					
	Viscosity @ 60 F					
	Viscosity @ Flowing Temp					
	Max. Flow (CFH, GPM, lb/hr)					
	△ P @ Max. Flow PSIG					
	Min. Flow (CFH, GPM, lb/hr)					
	△ P @ Min. Flow PSIG					
	Remarks					
Valve Specifications	Body Size					
	Port Size					
	Body Rating					
	End Connections					
	Material					
	Trim					
	Main Valve Characteristics					
	Seats (Double or Single)					
	Packing (Teflon or Molded)					
	Bonnet (Standard, Fin, Bellows)					
	Lubricator—Isolating Valve					
	On Air Failure	Valve	Valve	Valve	Valve	
	On Increased Reading	Valve	Valve	Valve	Valve	
Actuator	Operating Medium (Air-Liq.-Elect.)					
	Oper. Med. Press. Range					
	Actuator Type & Rating					
	Accessories					
	See Controller Sheet					

Date Required		Shipping Instructions	Billing Instructions
Customer Order No.			
Customer Inquiry			
Customer Req. No.			
		Date Received	Representative
		Date Processed	
		By	
		Quote Submitted	

or even radically different approach to the control requirements. An example of these differences occurs in control of a digester in a paper mill.

Each company specializing in paper mill instrumentation will offer a different combination of approaches for relief of vapors, control of cooking cycle, or methods of sensing cooking progress.

Fortunately, most purchasing departments have come to recognize that selection of instruments requires a close contact between the instrument engineer and the instrument company; therefore the flow of information between these two is not impeded or slowed down by the purchasing department.

This condition has only prevailed in companies where difficulties have arisen by transmitting questions and answers through intermediaries. The person who selects instruments will be wise to respect his exceptional position and also realize that his is a chore of specifying and requisitioning not purchasing. In a well-organized company the purchasing department personnel is fully aware of the pitfalls of contractual arrangements, delivery dates, shipping instructions and discounts, so is better equipped to handle these details.

Scheduling

Immediately upon determination of the scope of the job and preparation of requests to bid, a progress schedule should be laid out. This schedule, Fig. 2, should include each important function required for completing the job. The functions are taken from the article, "What an Instrument Department Might Do in Your Plant."[1]

In many cases, a realistic appraisal of the time requirements as compared to progress in the other phases of design and construction result in realization that additional man power may be required. The schedules of all features of the job are inter-related. For example, location of an instrument board or instrument building must be one of the first considerations while location of instrument piping, transmitters, thermometers and pressure gauges becomes much easier when the major piping has been laid out. Just the opposite is true of meter run and control valve considerations; space for adequate length of meter runs and the location of control valves must be taken into consideration when the piping is being laid out.

Scheduling of instrument drafting requires study of these same factors. Very little drafting can be started until the make, type and mechanical features of the instruments are determined. Detailing of instrument board layouts and details of piping and wiring of the boards follow requisitioning of the instruments. In many cases, the instrument company which is awarded the contract, furnishes drawings of the boards or, if the process has been standardized, details of a duplicate installation.

If standard installation details are not available, these must be prepared. Again, the method of approaching this problem is the subject for future discussion. Details of meter runs and control valve by-passes must be made available immediately.

Although expediting of orders is the prerogative of the purchasing or expediting group, the information concerning receipt of quotations and subsequently the delivery dates for equipment should be recorded and watched closely by the instrument department. This is particularly true if a section of the instrument department does the actual installation.

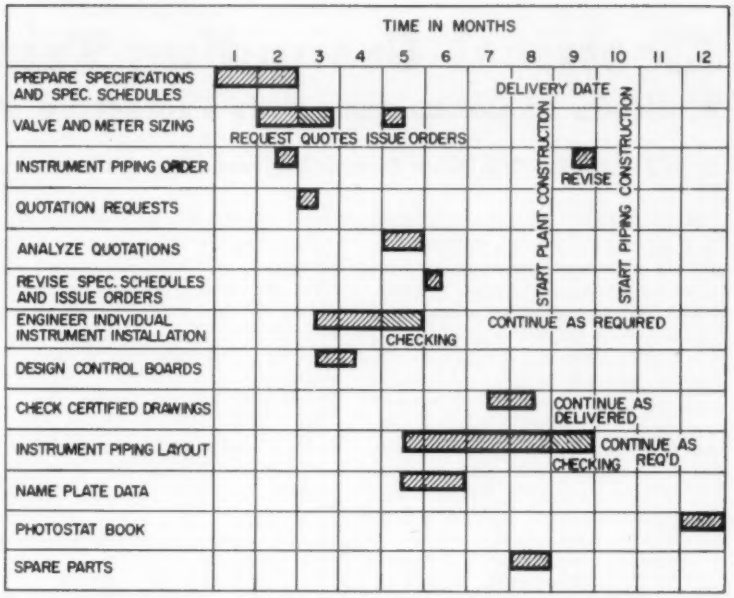

Fig. 2. Progress schedule such as this should include each important function required for completing a job. It should be made out as soon as scope of job is determined and requests for bids made. It can serve as manpower guide

Valve and Meter Run Sizing

One of the first steps that must be completed is a preliminary sizing of control valves and differential meter primary devices. This chore must precede piping layout. Sizing of primary device meter runs should require very little revision if the process flow sheet is correct. Size of the opening in the orifice or flow nozzle may come later after proper consideration of the recorder or controller to be used.

Additional variables preclude this accuracy in valve sizing. The pressure drop available across the valve varies with such things as pump discharge, length of lines to and from the valves, and differences in elevation between equipment involved. These variables are bound to vary as design progresses. Nevertheless, valve sizes must be determined, even though revisions are inevitable, so as to allow the piping layouts to progress. It is also important to order valves early in the program because they are required early in the construction schedule. Most other instruments are installed after the major pieces of equipment and piping are in place.

Reference to the valve sheet, Fig. 1, shows a line for valve size and port size. Requests to quote should always call attention to the fact that, of necessity, valves have been sized with one of the available slide rules or charts. This method applies to the products of the manufacturer furnishing the rule or chart. The supplier must check this sizing and offer, in addition to the size requested, an alternate which reflects valves from the supplier's own line which are best fitted to handle the listed capacity.

Another look in the crystal ball is necessary at this point. Availability of small pipe, copper tubing, thermocouple wire, fittings and other accessories to instrument installation, seems to change from month to month. No matter what the situation may be, it is advisable to place an order for a

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[1]PLANT ENGINEERING, September, 1954.

Electrical Grounding Transformers—

Methods of Connecting This Protective Unit in System

By L. J. CARPENTER, Power Systems Engineer, General Electric Co.

GROUNDING transformers are almost always applied to systems already existing, because on new systems the neutral can usually be established without the expense and complication of a grounding transformer. The physical location will depend on the type and arrangement of existing equipment. The method of connection will be governed by its location, the degree of protection desired for system and grounding equipment, protective device selectivity, system operating procedure and to some extent by the nature of he load.

Grounding transformers will, in general, be connected into the system at one of two locations. The first will be at the system bus, and the second will be at the main transformer secondary terminals or in the secondary connections nearby. It is often neither practical nor desirable to connect into a system bus without going through a protective device. This is especially true if the system bus is included in metal-clad switchgear.

Possible Obstacle

On the other hand, the conventional throat connected transformer commonly used in package substations, master unit substations, and load center unit substations, presents a serious obstacle to connecting a grounding transformer at the main transformer terminals, or in the connections between main transformer and switchgear bus. Therefore, the type and arrangement of existing equipment may determine the location of the grounding transformer connection, and whether or not the connections will be made solidly or through a circuit breaker.

When a grounding transformer is connected to a system, two objectives are sought in protection. The system should be protected against faults in the grounding transformer, and back-up protection should be provided for ground faults in the system which are not cleared by some other protective device.

The first objective can be accomplished by isolating the grounding transformer or by shutting down the system. Figure 1 illustrates the condition described. If breaker D is provided, it becomes possible to isolate the grounding transformer if a fault develops within the transformer itself. If breaker D is not provided, protection can be obtained by tripping breaker B or breaker A, thus shutting down the system.

The second objective can be accomplished in the same manner except that selectivity and operating procedure may influence the manner in which it is accomplished. Assume a ground fault on the feeder, Fig. 1, which breaker C fails to clear. It is desirable under such a condition to trip breaker B and shut down the system. This avoids the possibility of continued and prolonged operation with a ground fault on the system. As an alternative, breaker D can be tripped, leaving the system ungrounded with the single line-to-ground fault left on the system. Although this second alternative is not usually recommended, it sometimes appears desirable from a practical standpoint. It is never desirable when line to neutral loads are served from a system with neutral derived from a grounding transformer. To do it requires a

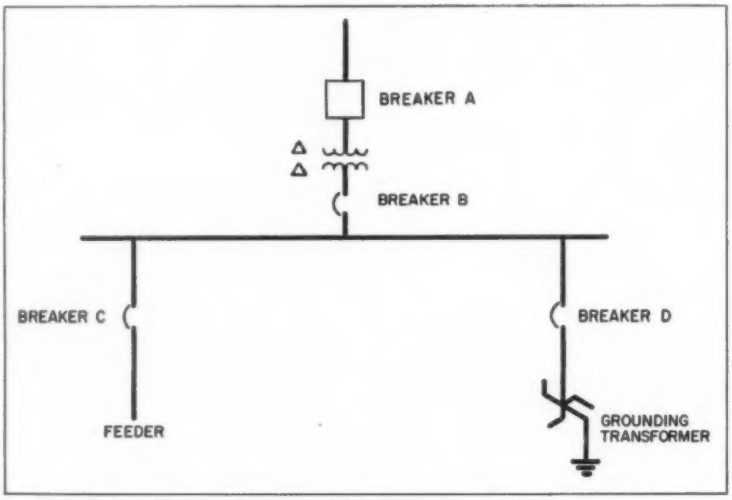


Fig. 1. Line diagram showing grounding transformer location in delta system

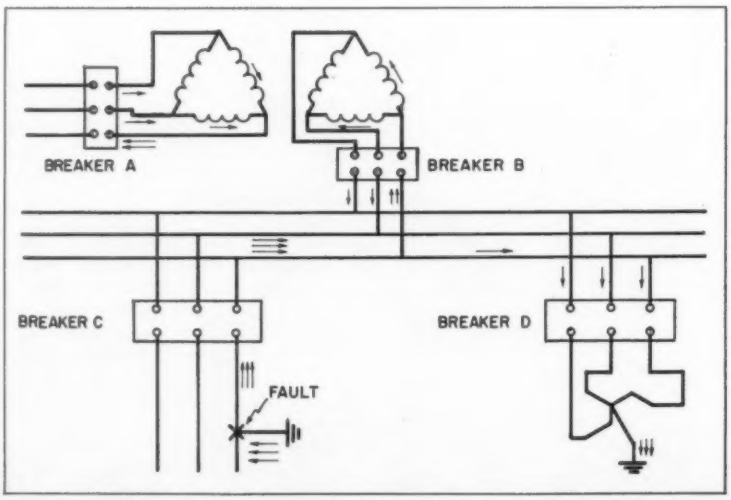


Fig. 2. Line-to-ground fault current in a system with grounding transformer

breaker in the grounding transformer feeder.

480Y/277 v systems supplying 277 v fluorescent lighting demand special consideration because it is very essential that the neutral connection never be opened. To do so will impose excessive voltages on the line to neutral loads. For this reason, it is recommended that the grounding transformer be solidly connected into the 480Y/277 v system.

A grounding transformer is peculiar in the sense that during normal operation it draws only a small magnetizing current. During ground fault conditions in the associated system, current will flow in the grounding transformer connections. The magnitude of current will be largely determined by the manner of system neutral grounding; whether solid or through a neutral impedance. The pattern of fault current is illustrated in Fig. 2.

Protective devices for system voltages of 2400 and above are almost universally actuated by current transformers and relays. At 600 v and below, series trip devices are usually used. Also, it is common practice in industrial systems to ground the neutral of systems 2400 v and above through a resistor, whereas at 600 v and below, system neutrals are grounded solidly. For these reasons grounding transformer connections in the medium voltage range must be treated separately from those in the low voltage range.

The most common method of connecting grounding transformers on systems of 2400 v and above is shown in Fig. 3. This method has the advantage of extreme flexibility. With the full complement of breakers and relay as shown the relaying will function as follows:

Delta connected current transformers and relays in the grounding transformer feeder circuit will detect faults only in the grounding transformer. They can be selected and set for extremely low pickup if desired. They will be arranged to trip breaker D and sound an alarm to warn the operator that the system is operating ungrounded.

The relay in the neutral can be selected to protect the grounding equipment and be made selective with other ground fault relays in the system, providing the current transformers, relays and grounding resistor are properly selected.

It should be noted that with this arrangement protection is afforded for ground faults between the main transformer secondaries and the main secondary breaker (breaker B). Even if

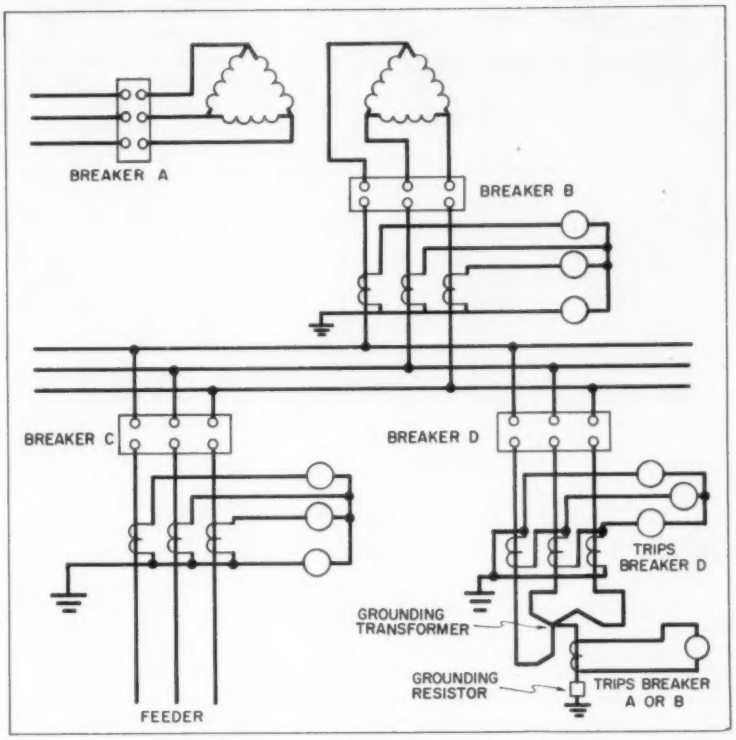


Fig. 3. Common grounding transformer connection in systems of 2400 v and up

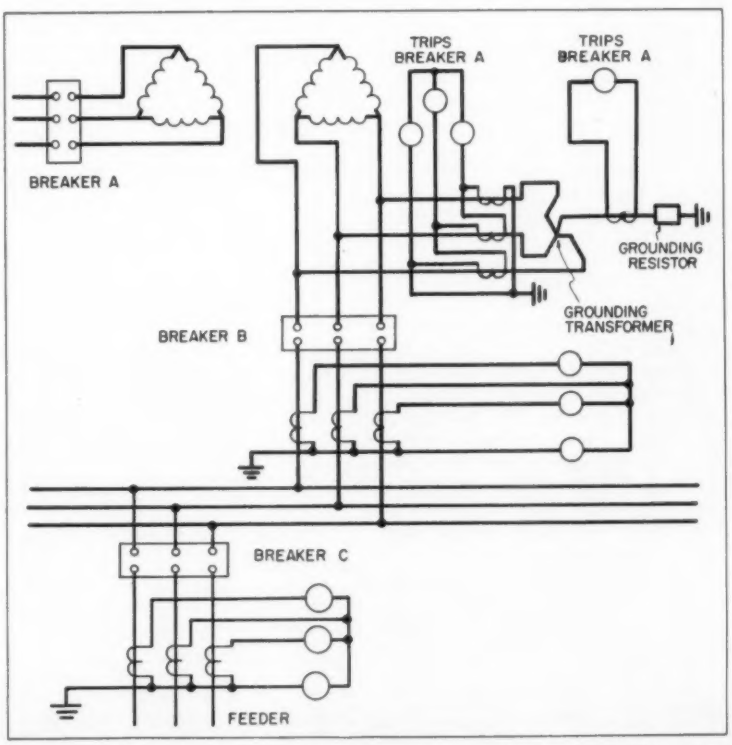


Fig. 4. Another grounding transformer connection method, systems 2400 v, up

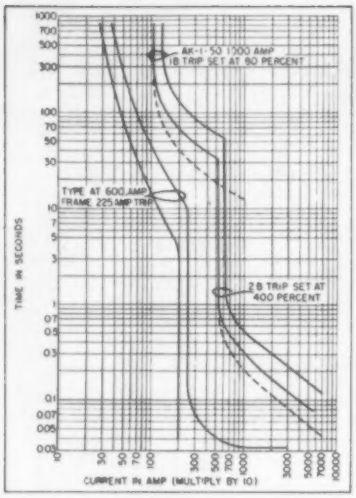

AK-1-50 1200 AMP
1B TRIP SET AT 90 PERCENT
TYPE AT 600 AMP
FRAME 225 AMP TRIP
2B TRIP SET AT
400 PERCENT
TIME IN SECONDS
CURRENT IN AMP (MULTIPLY BY 10)

Fig. 5. Coordination for ground fault

no primary breaker (breaker A) were provided, the neutral relay will pick up for such a fault and will trip breaker B which de-energizes the grounding transformer and stops the flow of ground fault current. It is true that for such a fault the relay target will give no indication of the fault location. This is no different, however, than any other backup relay operation.

The delta connected current transformers and relays in the grounding transformer feeder circuit may be omitted. Such omission sacrifices the possibility of isolating the grounding transformer in the event of an internal fault, and the main secondary breaker B is depended upon to trip. There is little economy in omitting these current transformers and relays, in most cases, if the circuit breaker is provided. In some cases it is permissible to omit the circuit breaker D and depend on the main secondary breaker B to trip for internal faults in the grounding transformer, but such omission tends to degrade the reliability of the switchgear bus, particularly when the switchgear is modern and metal-clad.

Figure 4 shows an alternate method of connecting the grounding transformer into the system. This method, where applicable, has the advantage of omitting a breaker in the grounding transformer feeder circuit. It is generally applicable only where breaker A is provided. Primary fuses do not provide protection for ground faults between the main transformer secondaries and the secondary breaker, nor backup protection for system faults. Little, if any, protection is afforded the grounding transformer itself, with primary fuses.

On small systems, where solid grounding of the neutral is permissible, it is sometimes possible to gain a measure of protection with primary fuses, but this possibility should always be examined carefully. It will be noted from Fig. 2 that ground fault currents in the secondary are not reflected in direct proportion in the primary when grounding transformers are involved.

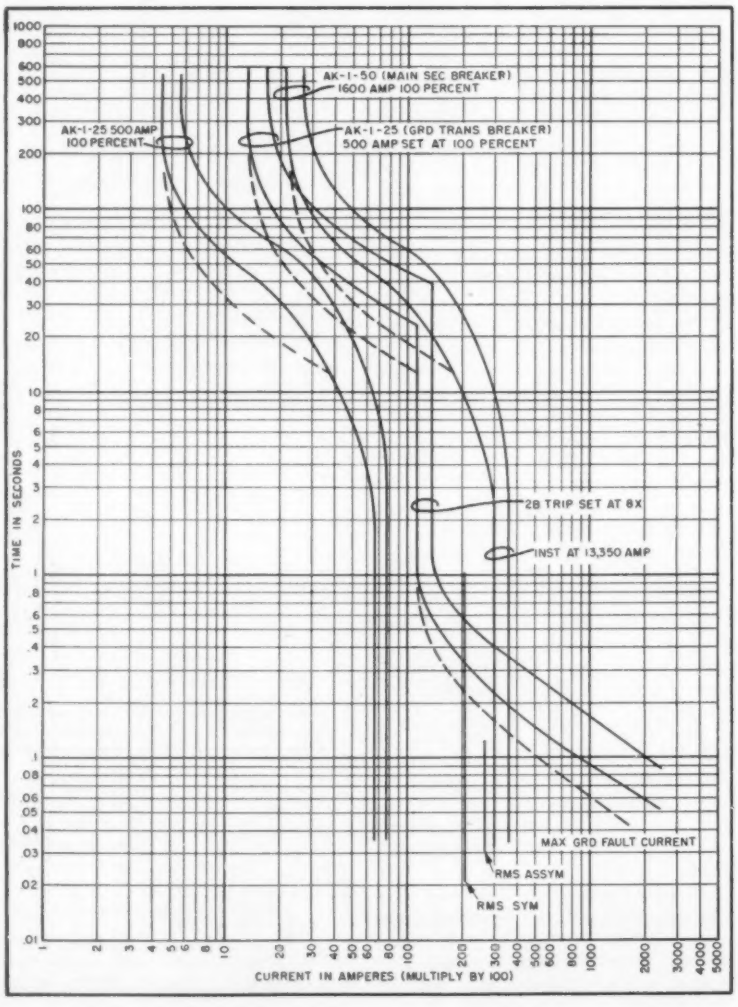
A standard line of dry-type grounding transformers is now available for indoor application to 480 v systems. Grounding transformers for other than 480 v systems can be designed and built in dry-type for indoor application, and in liquid-filled type for outdoor application at all voltages. The following discussion relates specifically to indoor application in 480 v systems but it applies in general to all applications in low voltage range.

The following objectives are sought in the protective scheme of a system using a grounding transformer.

1. Accomplishment of desired selectivity between protective devices.
2. Protection of the system and the grounding transformer in accordance with established codes and practices.
3. Never tripping off grounding transformers when 480Y/277 v lighting loads are served.

The simplest method of connecting a grounding transformer to a 480 v system is illustrated in Fig. 7, which shows the method of connection and also provides an example of the application. The load is served by a bank of three single-phase, 250 kva, 480 v transformers with primary fuses. A main secondary type AK-1-50, 1000 amp circuit breaker is provided and the feeder breakers are Trumbull type AT, 600 amp frame, 225 amp trip. The time-current characteristic curves, showing time co-ordination, are shown in Fig. 5. These curves illustrate coordination for a single line-to-ground fault on a feeder. Because the main secondary breaker will detect only ⅔ of the current in one pole of the feed-

Fig. 6. Coordination of direct-acting breaker trips for feeder ground fault



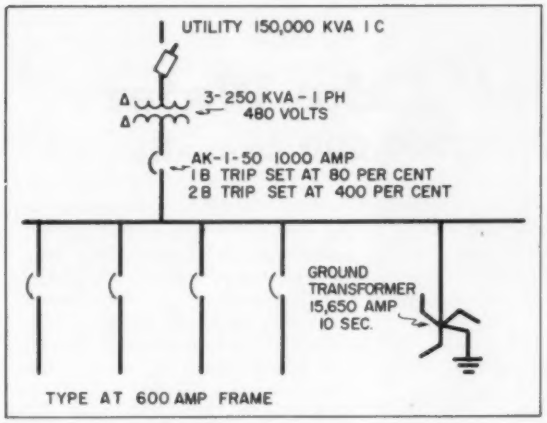


Fig. 7. Hookup of grounding transformer in 480 v system

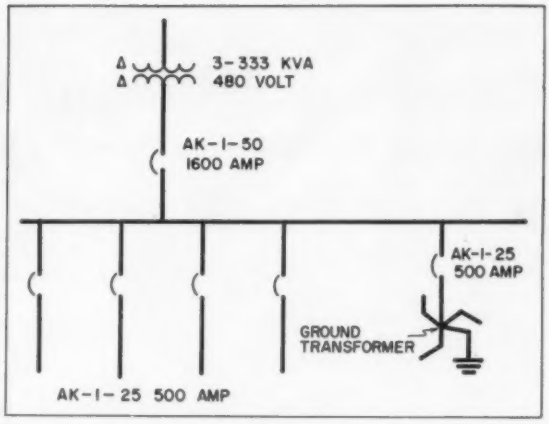


Fig. 8. Method uses breaker between grd transformer, bus

er breaker, the characteristic curve of the AK-1-50 circuit breaker is plotted at 1½ times the actual current values.

The co-ordination curves show that the following objectives are accomplished:

1. The series trip devices are selective at all values of fault current.
2. The main secondary breaker is set to pick up at 800 amp. The continuous rating of the grounding transformer is approximately 625 amp. Therefore the grounding transformer is protected in accordance with National Electrical Code requirements for protection of transformers.
3. The main secondary breaker will trip in less than 10 seconds at the rated neutral current of the grounding transformer.
4. A single line-to-ground fault between the main transformer and the main secondary breaker of about 2400 amp will cause the main secondary breaker to trip. This will de-energize the system and stop the flow of gound fault current.

This method is applicable where (a) solid connection to the bus is possible and permissible, (b) feeder breaker trip ratings are not too large relative to main transformer and main secondary breaker rating (the feeder breaker rating should not be greater than approximately one-third the main secondary breaker rating), (c) it is desirable to avoid any possibility of losing the system neutral ground connection.

The grounding transformer can also be connected solidly to the main transformer secondary terminals. By doing this, protection of the grounding transformer and the portion of the system from main transformer to main secondary breaker is essentially omitted. There is little chance that a fault of this nature would be detected by primary fuses. Where a primary breaker is provided, protection can be accomplished by using current transformers and relays in the grounding transformer feeder circuit and the neutral circuit as was done in the medium voltage system shown in Fig. 4.

A second method of connecting a grounding transformer to the system is illustrated in Fig. 8. This figure shows the method of connection and

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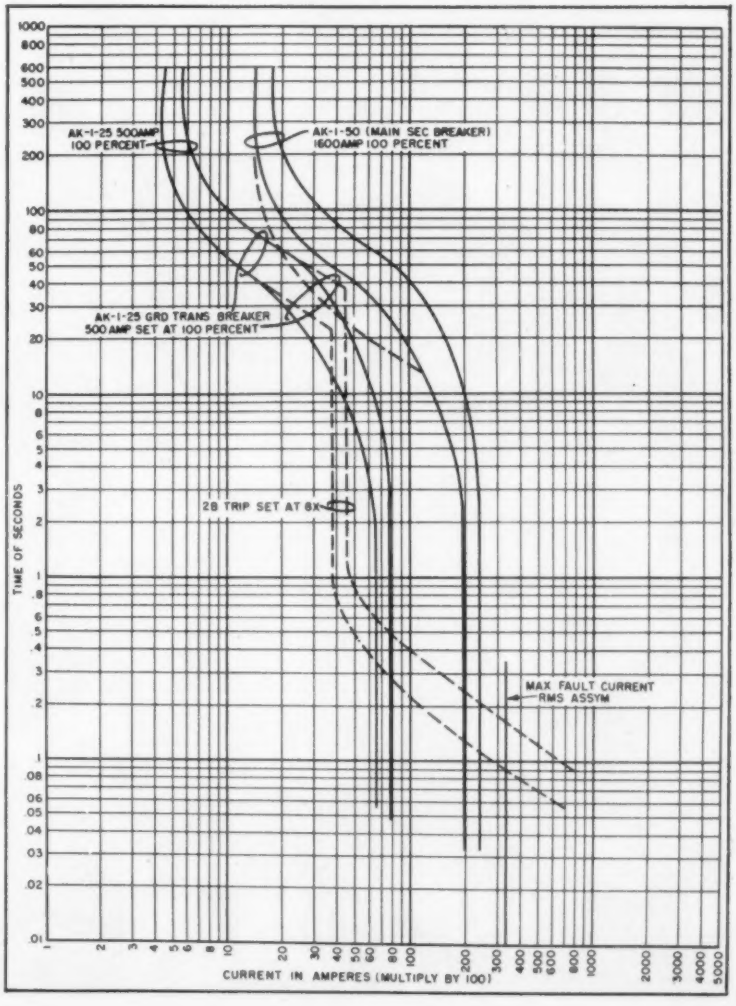
Fig. 9. Circuit breaker trip coordination for a three-phase electrical fault



Company "Cleans Up" Lake Water

Chemical Purification Process Saves $100,000 Annually

PURIFICATION of water to be used in various industrial cooling processes was a serious problem for Dominion Foundries and Steel Ltd., Hamilton, Ontario. Within the past five years, this company has spent approximately $50 million in various expansion programs which have created a need for larger quantities of water. This water must be industrially clean and odor free, reasonably priced, and suitable for utilization in cleaning manufactured bar stock and cooling the rolling mills.

It became apparent to Dofasco, as the company is known in Canada, in 1952 that it would be profitable to operate its own water-purification plant, as completion of the early phases of the expansion program was beginning to make the water supply a costly and complicated proposition. Daily requirements at that time were approximately 9 million Imperial gal. Of this total, the company used 4.5 million gal of city-treated water at a cost of 15 cents per 1000 gal. This meant an annual bill from the City of Hamilton of some $250,000.

Balance of these 1952 requirements —4.5 million gal—was drawn through the company's own pumps from the water of nearby Hamilton Bay. Maximum turbidities ran over 200 ppm and averaged over 40 ppm. Furthermore, these high turbidities often lasted for periods of one to two weeks. This was further complicated by contamination with chemical wastes and sewage. Additionally, the pH of the raw water often went down to an average of 5.0 when acid wastes from surrounding industry was dumped into the Bay.

At that time, the water supply was screened to remove coarse solids. However, mud, silt and other finely divided material was not removed and, as a consequence, the pipes and mains carrying the water would clog from time to time and present costly maintenance and repair problems. Furthermore, odor from the Bay water, as used in the plant processes, was anything but pleasant.

Fig. 1. As turbid, raw lake water reaches plant, it is treated with various chemicals which are mixed by series of baffles before water enters precipitators

Benefits Gained

To complicate the situation, the City of Hamilton's own pumping and filtration facilities were often quite strained in periods of hot weather. Peak domestic demands, coupled with the company's usage, sometimes meant that certain sections of the city would have low water pressure. This prompted official requests from the city to industry in Hamilton to "try-to-go-easy" on utilization at these times. In these circumstances, the company felt it necessary to make itself partially independent of the city system.

With the installation of its own water-purification plant, Dofasco would gain these benefits: a plentiful supply of water; saving in money; and more pleasant working conditions for its own personnel.

The Permutit Co. of Canada Ltd., a subsidiary of The Permutit Co., New York City, installed equipment for purifying the water drawn from Hamilton Bay. Two precipitators (see Fig. 4.), used for either coagulation and settling or coagulation and settling plus softening, each with a capacity of 5200 Imperial gpm, were constructed. Dimensions of each of these units are 47 ft wide by 96 ft long by 17 ft deep. Four chemical feeders, to treat the water with lime, alum, clay and, when required, sulfuric acid, were also installed. This installed equipment has a rated capacity of 15 million Imperial

gal daily (18 million U.S. gal) which is more than required at present, but which takes into consideration future demands. (See Figs. 2 and 3.)

This purification plant has been in operation since March, 1954 and provides industrially clean water at a cost of four cents per 1000 Imperial gal, in place of the city-treated water costing 15 cents per 1000 gal, cutting costs by about 75 per cent. The plant is expected to pay for itself within four or five years time.

With increased production and processing, overall use of water has increased from 9 million Imperial gal to 11 million Imperial gal daily. Demand on the city supply has been cut from 4.5 to 3 million Imperial gal in the same period. Thus, the direct saving in city water charges is about $100,000 annually, including the difference in cost if city water had been purchased to take care of the additional demands.

Total cost of the water treating project was estimated to be $575,000, of which $100,000 represents engineering, chemical feeders, purification and control equipment. At present, the system treats an average of 8 million gal of water daily. Average total cost of operating the equipment is $323 per day. A realistic figure of the yearly maintenance cost is not available as yet due to the fact that the plant has been operating for only a short period.

Reduced Turbidity

Four chemical feeders distribute almost three tons of chemical per day. Average dosages represent 1500 lb of lime, 2700 lb of clay, and 1400 lb of alum and occasionally, sulfuric acid. With these chemicals added to the supply, the raw water is mixed by baffles (Fig. 1.) before entering the precipitators, at a valve controlled rate, for coagulation and filtration. This controlled flow maintains water at the proper level. Height of the sludge blanket in the units is automatically controlled by photoelectric cells operating a beam of light shining through a continuous thin stream of water drawn from a pre-selected level in the upflow sludge filter compartment.

This treatment reduces turbidity of the raw water to an average of 5 ppm, making it suitable for industrial utilization. It also brings the pH of the raw water from an acid condition of 5.0 to 6.0 to a slightly alkaline condition of 7.5.

The equipment is providing an abundant supply of clarified water to meet present and contemplated future requirements, with a minimum of labor, minor repairs and other maintenance costs, at substantial savings.

Fig. 2. More than 1000 lb of lime dumped into hopper daily for water treatment

Fig. 3. Three of four chemical feeders which supply lime, alum, clay to water

Fig. 4. Two precipitators are used both for softening and coagulating purposes

Fig. 1. All welding machines should be installed by a competent electrician and in accordance with the National Electrical Code. Manufacturers' instruction manual should always be open and referred to throughout the installation

Safety Practices in Arc Welding

By LLOYD C. NESBITT, Field Engineer, Metal and Thermit Corp.

SAFETY IN THE weld shop, like safety anywhere else, is largely a matter of common sense directed at self-preservation. It simply involves understanding the hazards, and taking sensible precautions against them.

Special hazards of the weld shop stem from electricity and its manifestations. They include defective equipment, faulty installation, radiation from the arc, spatter, fumes and danger of fire. They can also result from carelessness, from disregarding or exceeding the rated duty cycles of the equipment and from failure to observe established safety rules.

Remedy lies in the use of standard high quality equipment, properly installed, adequate protective devices, thorough instruction of personnel in safe practices, and effective enforcement of safety rules.

A good place to begin the discussion of safety in the weld shop is with the welding machine; this is the mainspring of all activity in the shop.

Arc welding machines consist of the motor generator set, the selenium cell rectified type for DC current and the two-winding, air-cooled, transformer type for AC. In general, these machines are rated and built to standards set up by NEMA to perform on a certain duty cycle. Thus, a 60 per cent duty cycle machine is built as an industrial heavy duty machine. The 50 per cent duty cycle machine is usually a lighter machine intended for less protracted work. There is a third class, of the a-c transformer type, known as a limited input machine; this is designed for intermittent welding of the garage and blacksmith shop variety.

The point to be made here is the hazard involved in overloading the welding machine. This can cause burned out coils and may start fires and involve electrical hazards. An industrial machine rated 60 per cent duty cycle may be used at rated capacity for 6 minutes of each 10 minute cycle. This means 6 minutes of welding plus 4 minutes of idling. Most machines on the market will fulfill this requirement but not too many will do more than this. It is good safe practice to stay within the limits established by the manufacturer of the machine.

Much has been said and written about the dangers of present day open circuit voltages of alternating current welding machines. The fact remains that they are *all* high enough to be dangerous, except those machines which have been especially equipped with contactors, etc., to lower the open circuit voltage. As the usefulness of these machines has been found rather limited, machines with normal voltages are generally used. If these

are properly installed, with the case and one side of the secondary grounded, the hazard involved is reduced to a minimum.

Welding machines should be installed by a competent electrician with the manufacturer's instruction book open for reference. The National Electrical Code covers proper installation procedures for his guidance. Electricians should make certain that a line cut-off switch is installed at the primary cable take-off. Any switch or circuit breaker used must be able to open the circuit under any conditions of load.

Here's a Booby Trap!

Recently we inspected the installation of several single phase transformer type welding machines in the City of Chicago which had been hooked up to a 220 volt, three-phase line by an amateur electrician.

Primary leads of the machine were attached correctly across two of the phases, but the line from the third phase had been bolted to the welder case, ostensibly to act as a ground. Actually this amateur had hooked up a lethal booby trap by having a high potential between the welder case and either his electrode holder or ground clamp.

Secondary or working side of the welding machine may be less dangerous than the primary side, because the competent welder realizes that some precautions must be taken. Faulty welding cables or sloppy connections cause current to leak in the form of heat. Bad connections, such as loose terminal lugs at the machine or poor connections at the rod holder have been the cause of burns.

Sound connections pay dividends as well as eliminate whatever hazards are involved. Pipes carrying gases, flammable liquids or electrical conductors should never be used as ground returns. Any pipe structures used as ground returns should have the joints checked for sparking or heating. Joints should be bonded if such structures are to be permanently used as ground returns.

Where internal-combustion engine-driven generators are used inside buildings or confined areas, care must be used to conduct the engine exhaust to the outside atmosphere. Welding leads and primary power cables must be kept clear of aisles, passageways and doors. They must be kept from places where there is a possibility of machines or trucks running over them.

It is good planning to locate the machines so as to avoid excessive length in the welding cables. Sometimes the machines can be set on racks in groups. These may be on the floor or may be elevated out of the way, if the design of the machine permits manipulation of the controls from floor level. Racks must be adequately designed and the welding machines securely bolted down so as not to be pulled from position by dragging on the welding cables. Accessibility to the machines is paramount whatever placement method is used. Planning will pay off.

Welding cables can be cut into nominal lengths of 25 to 50 ft and provided with cable connectors. Total lengths required for each operation can then be made up of the nominal lengths. This is a good means of tidying up the cable situation.

Success of a welding program in any plant depends mostly on the welder who operates the welding machine and uses the welding booth or area. He should be indoctrinated with the general safety rules established for the plant, and also those special rules which must be established because of the peculiarities of his job.

A competent welder is a skilled workman, and usually recognizes the need for law and order in the conduct of his work, to preserve his health and well being. Such a man readily adopts a good attitude towards the rules and does not become careless through familiarity. Too much emphasis cannot be placed on inducing the welder to adopt the proper attitude towards safety.

One manufacturer of welding equipment estimates that there is enough energy in a single welding arc to operate your automobile. Part of this energy is converted to rays in the arc and scattered broadcast. These rays run through the spectrum of wave lengths from x-rays through infra-red rays; wave lengths vary from about 90 micro-millimeters to 1200 micro-millimeters. An analysis of the wave bands will show how to engage in safe practices in the presence of the arc.

Some Rays Dangerous

Wave lengths from 90 to about 98 micro-millimeters contain small amounts of gamma and x-rays. However, at these wave lengths their traveling and penetrating power is greatly reduced and they are absorbed by atmosphere.

Wave lengths from 98 to about 400 micro-millimeters constitute the ultra-violet band. The upper portion of this band has pronounced germicidal and tissue-destroying properties and is dangerous at close quarters. Protection from the ultra-violet rays must be provided for both skin and eyes.

Wave lengths from 400 to about 780 micro-millimeters constitute the visible light band. Protection for the eyes must be provided across this entire band.

Infra-red rays occupy the band from 780 to about 1200 micro-millimeters. Infra-red rays are chemical and ther-

Fig. 2. Open circuit voltage of the average welding machine makes it mandatory to use an insulated electrode holder

Fig. 3. What the safely dressed welder will wear: helmet, gloves and protective outer clothing. Radiation can injure

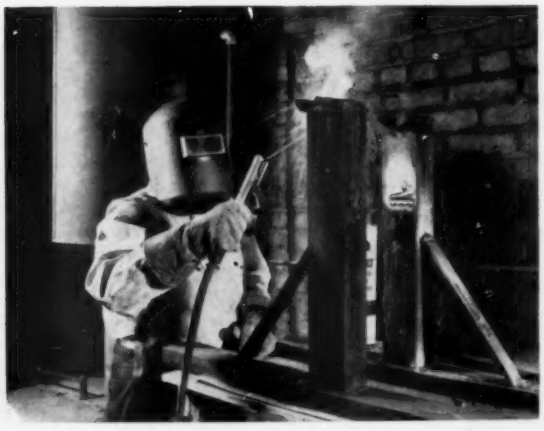


Fig. 4. Welders should wear goggles when removing slag or chipping welds

mal radiations, requiring protection for both eyes and skin.

Clinically, ultra-violet rays cause severe inflammation of both the eyes and surrounding tissues, similar to sunburn. Visible rays may be of such extreme intensity as to cause eye-strain and produce temporary blindness, and can result in accidents in a busy weld shop. Infra-red rays penetrate eye tissues and cause a cumulative effect of tissue change, possibly resulting in cataracts, injury of retina and opacity of the cornea and aqueous chamber.

Since the entire band of rays from the welding arc affects the eyes in some measure, protection involves the wearing of filter lenses properly designed to eliminate all harmful radiation and to reduce visible radiation to eliminate glare.

Research in eye protection has been carried on by a number of institutions. As a result of this work, standards have been established for protective lenses for the welding industry.

The National Bureau of Standards, for example, has developed curves showing percentage of transmission of radiation, plotted against wave lengths in micro-millimeters. Lenses made to government specifications will, of course, follow these curves. They universally will show 0 per cent transmission to 340 micro-millimeters, which excludes the ultra short wave band; they also show 0 per cent transmission or nearly so, from 740 micro-millimeters on up which excludes the infra-red band.

According to present federal specifications, specific shades of filter lenses are recommended for use with different ranges of amperage in the welding current, as follows:

Filter Lens No.	Amperage of Welding Current
Shade 8	30-75
Shade 10	75-200
Shade 12	200-400
Shade 14	over 400

These recommendations are for welding and cutting with the electric arc. Shades 9, 11 and 13 may be used to fill individual needs as a variant from the shades mentioned.

Most users have learned to insist on lenses made to U. S. Government specifications.

Some manufacturers of lenses have added a thin film of stainless steel or silver on one side of the lens. This film, less than one micro-millimeter thick, filters out all infra-red rays and some waves from the visible band. These lenses have proved their worth on types of welding such as the tungsten-arc, gas-shielded process where the energy from the arc seems greater than from the ordinary ferrous arc.

One of the most important protective devices for the welder is the helmet or hand shield. When properly fitted with filter lenses and cover plates, these devices protect the eyes, face, head and neck from injurious radiant energy from the electric arc, and from flying bits of molten metal produced during the welding process. The gas welding flame also emits some rays and protection must be employed with this process, particularly against the infra-red band.

Welders should wear suitable goggles to protect the eyes when removing slag from welds and when chipping and grinding welds. For helpers and others who must work in the vicinity of heavy arc welding operations, suitable colored flash goggles are recommended if screen protection or the like is not provided. Goggle frames should not readily conduct heat, should be easy to sterilize and not readily flammable. These goggles should have vents to provide ventilation without admitting glare from the welding.

Protective clothing is worn largely to protect the welder from spatter. Hot slag chipped from a weld may also be a hazard. Protective clothing may consist of coat, capes and/or sleeves, trousers and spats of heat resisting leather or treated canvas. These materials are also effective against radiation hazards when worn over everyday clothing. Outer clothing should be free from oil or grease. As sparks, hot metal or hot slag may lodge in rolled up sleeves, in pockets or in cuffs of overalls or trousers, sleeves and collars should be kept buttoned and pockets eliminated from the front of outer garments.

For overhead welding or welding in extremely confined spaces, the ears can be protected by using wool or rubber plugs, or by covering them with wire screen protectors.

Gloves are an extremely important part of what the safety-conscious welder wears. Statistically, the average welder in the fabricating shop uses about 26 pairs of gloves per year. Because some welders' gloves have been known to last for several months, it follows that others last only days.

Condition of the welder's gloves is very important. A welder who is not happy with the gloves issued to him may deliberately make them unfit for safe use. A welder who is satisfied with his gloves will generally take care of them, especially if he thinks they are of good quality and comfortable.

Two main designs of gloves are made. The Gunn-cut requires less leather, has the two middle fingers set in. This cut, using horsehide, makes a very good glove at a moderate price if the seam caused by insetting the two middle fingers is acceptable to the welder. The Clute-cut glove is cut from a single piece of leather with no seams on the palm of the glove. This requires more leather and is more expensive.

Regardless of the type of glove, ventilation and roominess are necessary features. A closely fitting glove will become very warm inside and cause the wearer's hand to sweat. He

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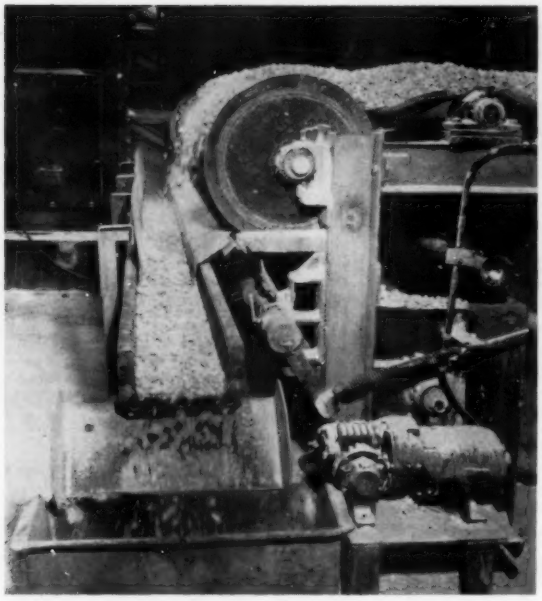


Fig. 1. Oscillating conveyor from calcining equipment can discharge at either end depending on material carried

Fig. 2. Conveyor across top of silos fills them; conveyor at bottom delivers alumina from silos, as needed, to bag filling

Dustless Conveyor Duty at Reynolds

Hot, Dusty Material Goes Places Without Fuss, Muss

AN INTERESTING SYSTEM of dust-tight oscillating conveyors has been installed at the Hurricane Creek plant of Reynolds Metals Company in Bauxite, Ark. It is for use in conjunction with an activated alumina processing line; this type of conveyor has been found to be particularly well adapted to the type of service encountered here.

It's Dusty Stuff

Activated alumina is a mixture of aluminum oxides made by calcining aluminum oxide trihydrate to produce a crystalline material. The raw material is delivered to the calcining operation by one of the oscillating conveyors. As the alumina is discharged from the calcining equipment it is in the form of hot abrasive chips and dust at approximately 500 F. It is delivered to a short oscillating conveyor, about 15 ft long. It is shown in Fig. 1.

As calcined alumina is used for the production of aluminum fluoride and activated alumina, this short, compact conveyor has been installed so that it can be turned end-for-end. In one position it delivers to the elevator in the background of Fig. 1. This carries the activated alumina to the horizontal oscillating conveyors across the tops of the storage silos. When the short oscillating conveyor at the discharge end of the calciner is in the position shown in Fig. 1, it carries the material to a chute leading to the aluminum fluoride process.

The oscillating conveyor across the tops of the eight concrete stave silos is shown in Fig. 2. It is 201 ft long and is made up of three standard units, each 67 ft long. Discharge into any of the silos is accomplished by means of manually-operated gates fitted to the carrying troughs. Each of these units has a standard drive consisting of 1 hp totally-enclosed, fan-cooled motor, rigidly mounted on a welded steel base with v-belt transmission. The conveyor has dust-tight flexible connections at the discharge gates and at the ends.

Reclamation from the silos is through manually-operated dust-tight gates through which the activated alumina flows into an oscillating conveyor system. This system, also shown in Fig. 2 at the bottom of the silos, consists of two units totalling about 126 ft in length. Each unit is equipped with a 1 hp standard drive as explained for the system for filling the silos. Each of the two units has dust-tight covers with flexible dust-tight inlet and discharge connections. Discharge from the conveyor is to a bucket elevator, seen in the left background of Fig. 2. This delivers the alumina to the bagging station.

There are several reasons why the oscillating type of conveyor is preferable for these handling operations. They are highly suitable for handling the hot material and the drives and supporting structure are readily insulated from the heat. The steel trough aids greatly in cooling the activated alumina and handles it with minimum degradation. In addition, the oscillating conveyors are easily made dustproof and the adsorptive properties of the activated alumina are preserved by the dust-tight covering which prevents it from picking up moisture from the atmosphere. The dust-tight feature is also a great help from the standpoint of good plant housekeeping.

Abrasive, Too

Oscillating conveyors are also particularly well adapted for handling the abrasive material which they move smoothly and silently. There being few moving parts their maintenance is at a minimum. Such conveyors can, furthermore, be mounted on simple inexpensive supports as seen in the illustrations, and their operation is as efficient with partial loading as at full.

Water Cooled Compressors—

Selection and Application for Heavy Duty

By ROBERT A. SCHAEFER, Application Engineer, Worthington Corporation

SELECTION OF ANY compressor requires a complete understanding of its application. Manufacturer as well as purchaser should be fully aware of the end use, operating characteristics, and installation peculiarities, if the full economic potential of the plant is to be realized.

Basically, you are interested in buying a compressor that will deliver a certain amount of air at a given pressure, with maximum efficiency. But efficiency, in the measure of economy, encompasses initial and installation costs, water and power requirements, as well as bhp per 100 cfm of free air. The quality of the compressor itself is a factor of economy, to achieve low cost maintenance, and sustain plant production.

Let's suppose that we have established the need for a continuous duty, eight-24 hour per day compressor. This puts us in the heavy duty class. Nominally, the heavy duty compressor ranges in size from five to 5000 hp, with a free air capacity from 25 to 25,000 cfm; larger sizes are available if the need is indicated.

Now that we're in the market, let's look at the considerations that will govern our selection.

Required installed capacity for a given plant depends on several things; plant load factor; future needs; leakage allowance.

Load factor is a determinable value. An accurate evaluation of the operating cycle throughout the plant, with respect to the number of air-using devices and amount of work obtained from them, will almost pinpoint this figure. Long range planning, taking into account business cycles, will predict future air needs reasonably accurately; but the question of allowable leakage is forever a bone of contention.

Expected air losses have ranged as high as 25 per cent of the demand in some estimates, a tolerance that seems excessive. Many small leaks, some infinitely so, make up the total air loss. Most of them are mistakenly considered too minor to correct, and since air, being non-toxic, presents little hazard to employee and plant, stringent leakage prevention measures are generally overlooked.

Leaks Cost Money

Costliness of this practice is illustrated by an imaginary compressor plant of 1500 cfm free air capacity. Assume that 15 per cent, or 225 cfm, has been written off as leakage. If the plant operates at full capacity an average of five hours a day, 67,500 cubic feet of air is *knowingly* wasted every working day. In a period of 300 working days, 20,250,000 cubic feet of air has been irretrievably lost, with none converted into useful work. The "leakage" would have operated 10 pneumatic tools of 50 cfm maximum air consumption each for almost 675 hours at top production.

The result of this particular leakage allowance was about 67,500 bhp-hr lost, with no value returned. The assessment in dollars for condoning such a leaky system would easily pay for new valves and hoses, and justify the part time services of a maintenance man to check the lines.

In the average industrial plant, the number of air outlets makes it almost impossible to predict an absolutely tight system; but the cost of a "whistling" air distribution line should influence the plant engineer to adopt preventive measures that will hold the leakage to 5 per cent.

After establishing capacity requirements, there arises the question of single or multi-stage compression. The decision in favor of one or the other is influenced by initial cost, temperatures and horsepower savings. As suggested by the curves in Fig. 1, the latter consideration becomes significant only at 60 psig and above. But

Fig. 1. Approximate bhp required per 100 cfm free air

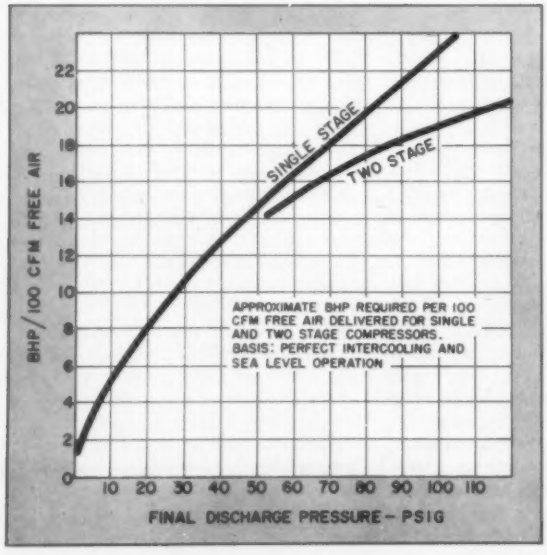
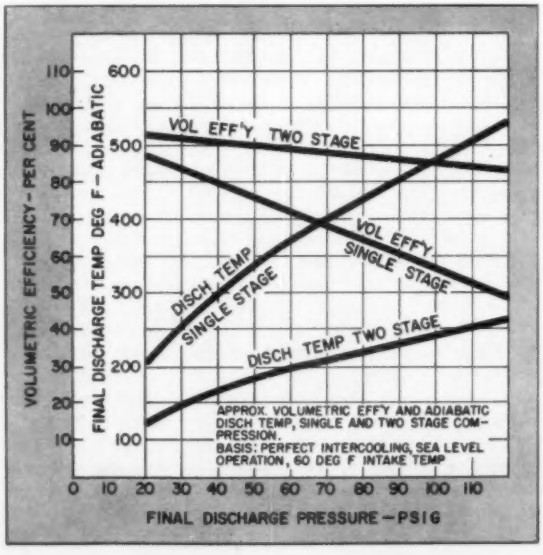


Fig. 2. Discharge temperature and volumetric efficiency curve



multi-stage compression must also consider the amount of air handled.

For instance, a 100 cfm air compressor discharging at 100 psig requires 22.5 bhp per 100 cfm if single stage, and 19.0 bhp per 100 cfm if two stage. On first inspection, the decision would be for two stage; but let's evaluate the two units using estimated water and power costs as shown in Table I.

The figures in Table I are not exact, of course, since compressor power costs would be evaluated as a percentage of the total plant energy cost.

Now, using representative water consumption figures[1] let's look at the effect of cooling water costs, given in Table II.

Since it would take more than 20 years for the economy of the two stage compressor to catch up with the difference in initial costs, it appears that the single stage compressor is the better selection. Maintenance and lubrication costs, not evaluated here, will favor the single stage even more.

For 100 to 125 psig discharge air compressors in the heavy duty class, multi-staging is considered only after the capacity requirements exceed about 300 cfm. And this rule-of-thumb evolves from discharge temperatures as well as horsepower.

Discharge Temperatures

To illustrate, a 5 in. bore by 5 in. stroke compressor may have the same suction and discharge pressure characteristics as a 14 in. by 13 in. compressor; hence, their respective adiabatic discharge temperatures are equal. In practice however, the actual discharge temperature of the 5 by 5 will be about 50 deg less than the 13 in. stroke, assuming the same cooling water temperature.

This apparent phenomenon results from the ratio of cubic foot capacity to jacket water cooling surface. That is, the smaller the bore, the greater the amount of cooling surface per cubic foot of compressed air. As the bore increases in size, so does the actual discharge temperature increase, approaching the adiabatic limit.

Large capacity compressors, with correspondingly large cylinder bores, avoid high temperature discharge conditions by multi-staging, with interstage cooling. The curve in Fig. 2 indicates the adiabatic discharge temperature of both single and two stage compressors as well as the approximate volumetric efficiency, for either type compression, at various discharge pressures.

Control of discharge temperature is important in keeping maintenance costs low. High temperatures will reduce ring and packing life, and add greatly to normal carbon deposits on the valves.

"Perfect intercooling" presumes that the suction temperatures of all stages in a multi-stage compressor are equal. If the intermediary suction temperatures increase above the first stage suction, the volumetric efficiency will decrease, and the bhp per 100 cfm increase. Standard compressor intercoolers are designed for a 20 deg "approach"; that is, if the cooling water is 80 F, the interstage air can be cooled to 100 F, or within 20 deg of the incoming water. Where perfect intercooling is not possible, performance will have to be adjusted. For estimating purposes, many engineers use a figure of 1 per cent increase in bhp per 100 cfm for every 5 deg above first stage suction. Volumetric efficiency decreases about 0.5 per cent for every 20 deg above first stage suction temperature.

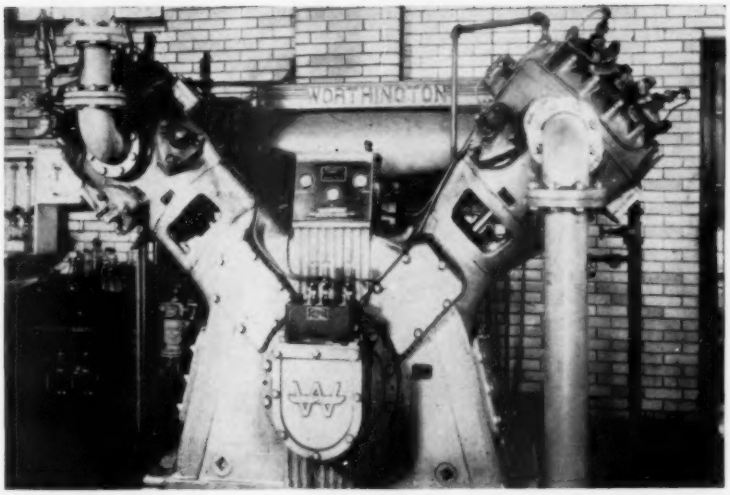


Fig. 3. Compact, two stage vertical angle compressor is easily installed, maintained

Power cost evaluations are important in the planning stages. Some areas will find steam cheaper than electric power; others will secure optimum economy from oil or gas engine drivers. But power selection depends not only on operating costs, it considers also supply limitations.

The use of one type prime mover in lieu of another is not entirely dependent on the immediate comparison of fuel costs. A given installation may show electric power cheaper than steam, but the introduction of a new production process six months hence, one using steam, may prove the latter power to be less expensive in the long run.

Too, the application of synchronous motors to a drive, with their ability to correct plant power factor, must not be overlooked. All of these variables must be surveyed for a searching and informative power analysis.

"How many compressors should I

Table I. Estimated water and power costs for single and two stage compressors

	Single Stage	Two Stage
Actual capacity, cfm free air	100	100
Brake horsepower	22.5	19.0
Operating hours per year	5000	5000
Kwhr per year	83,925	70,870
Compressor Power Cost		
Maximum kw demand—$1 per kw	$ 16.78	$ 14.17
First 1000 Kwhr @ $0.03	30.00	30.00
Next 4000 Kwhr @ $0.02	80.00	80.00
Next 15000 Kwhr @ $0.01	150.00	150.00
Next 30000 Kwhr @ $0.009	270.00	270.00
Next 50000 Kwhr @ $0.008	271.40	166.96
	$818.18	$711.13
Yearly saving in power costs due to multi-staging	$107.05	

[1] From Compressed Air and Gas Handbook.

Table II. Representative cooling water costs for single and two stage compressors

	Single Stage	Two Stage
Cooling water required, gal/100 cfm		
Aftercoolers	1.8	1.25
Intercoolers		**2.8
Cylinder jackets	1.3	
Total water, gpm	3.1	4.05
Gallons of water per year, in thousands	930	1215
Water cost per year, at $0.10/1000 gal	$ 93.00	$ 121.50
Yearly saving water costs, due single staging	$ 28.50	
Net saving favor two stage, power and water	$ 78.55	
**Intercooler and jackets in series		
Initial Equipment Cost	$2209.00	$4046.00

have?" The answer to this question results from several considerations: the cost of a production shutdown; power facilities; load cycle; cost of extending the distribution system; and space.

A production shutdown for instance, either total or partial, may cost the plant far more than the price of a 100 per cent standby compressor. Maintenance will play a significant role here, in deciding the magnitude of a "calculated risk."

Power limitations may exert influence for a multi-unit air supply, too. A single compressor, for example, may have a starting demand beyond the limits established by local power regulations. Splitting the total required capacity into two or three machines that are able to start separately would solve this problem.

Plant air requirements may take the maximum capacity of a single compressor during the normal work day, but fall off to a small fraction during the night. A second, smaller compressor, to handle light load periods would be desirable here.

Division of Load

If the end point use of the air occurs at widely separated areas, the division of the load between two or more compressors is preferable. This practice, known as multi-station arrangement, is widely used in large sprawling plants with long air distribution lines.

For example, a given plant needs 1500 cfm of air. One thousand cfm of that total is to be used for expanded production at a grinding shed near the existing compressor room; the remainder at a new building for paint spraying, a considerable distance away. The cost of extending the distribution system to the new building may be excessively high, or physically impossible, indicating the need for two compressors, 1000 and 500 cfm respectively.

Available space too, may lead to a multi-station arrangement. And it certainly will influence the choice of compressor.

Space evaluations are important. High cost of floor area in the plant dictates that every square foot be profitably occupied. But not at the expense of compressor accessibility.

A well lighted, ventilated, and accessible area is essential for heat dissipation as well as maintenance. Select your location with an eye to water and power facilities, too. Long extension lines are costly to install and add to maintenance problems.

Long distances between the intake filter and compressor are also to be avoided. Higher pressure drops are accompanied by vibrations encountered in long lengths of pipe, especially if overhead, and inadequately supported.

To be consistent with the attempt to establish the most economical installation, compressor capacity control should be investigated. The degree of regulation incorporated in a given compressor will dictate, to a great extent, the overall efficiency of the plant. Operation of the compressor without useful work being obtained from it can be as expensive as too much leakage. This could occur when the compressor runs for long periods without delivering air.

Optimum point in control application is to provide only that amount of air needed at a given moment. This is closely approximated by steam driven compressors, where capacity is varied by regulation of speed. Within the mechanical limits of the engine (minimum speed usually ¼ full rated speed), the capacity variation is infinite. The same possibilities do not exist on constant speed, motor driven units. Here, multi-step control is used to achieve the closest approach to the ideal.

Multi-step control normally occurs in three steps or five steps. The increments of capacity change vary with each type, but all function with fixed steps of reduction or increase. That is, the delivery of the compressor is altered to some fixed point, ranging from 0 to 100 per cent of full load. Three-step control for example, has load points of 0, 50, and 100 per cent; the increments, or steps, of change, are 50 per cent. Five-step control has load points of 0, 25, 50, 75, and 100 per cent; the compressor is loaded, or unloaded, in steps of 25 per cent each. Smaller increments of change can be found in some compressors, but the previously mentioned are most commonly used.

Multi-step controls are normally not effective on plant economy until the compressor size exceeds 75 hp. Units below this find sufficient regulation with "all-on" or "all-off" bypass control. The capacity of the compressor can be altered to either 0 per cent or 100 per cent of full load, with no intermediary points, and with the compressor running at constant speed.

One version of this type control, known as "start-stop," will allow the compressor to shut down and re-start automatically, as the demand dictates. Although adaptable to installations with erratic load requirements, because of starting demands, start-stop control is generally limited to compressors below 100 hp.

Flexible control can be achieved by combining start-stop and constant speed bypass into a single governing system. This arrangement, called "dual" control, will, by the flick of a switch, permit the compressor to operate on either system.

Type of Compressor

Like clothing, compressors come in all shapes and sizes. The decision for one over the other depends on location, soil conditions, service, and sometimes, individual preferences based on experience.

Present day labor and material costs often direct the selection to a compact, easily installed compressor, yet one that is easily maintained. The two stage, vertical angle, Y compressor shown in Fig. 3 fills just such a need. A packaged compressor for quick installation, it is equally adaptable where floor space is at a premium.

Conversely, where length is not limited, but headroom is shy, a horizontal compressor is desirable. The balanced opposed unit in Fig. 4 may be the selection here. This type machine is also well suited for those areas with bad soil or foundation characteristics. Inertia forces are largely cancelled out by the opposed construction with adjacent cranks, permitting smaller foun-

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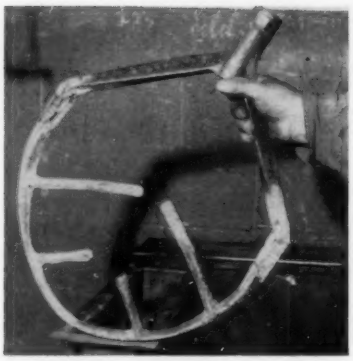


Fig. 1. Metal beater, prior to plastisol coating, showing effects of abrasion

Plastisols Lick Abrasives

Coating Prolongs Life of Mixer "Paddles"

By WILLIAM M. STUBE, Maintenance Field Supervisor
Carborundum Company, Niagara Falls, N. Y.

Mixing abrasives is hard on cast steel . . . Replacement of entire mixer beaters, or major parts of them, was costly . . . Carborundum tried coating the beaters with plastisol, got results that led to a coating program

MIXING IS AN operation of prime importance at the Carborundum Company, where abrasive grains, bonds and other materials are mixed prior to molding and firing operations in the manufacture of abrasive wheels.

For mixing, the company uses several 120-qt mixers, incorporating two cast steel beaters in each. The beaters are 18 in. in width, and have an overall height of 23½ in. The beater frame is heart-shaped, of metal 1¼-in. thick, and the blades, which vary with the beater type, are ¾ in. thick.

Because of the presence of the hard, sharp abrasive particles, wear on the beaters, which cost approximately $60.00 each, is hard — their average life under constant operation was about a month. Efforts were made to prolong the beaters by welding on new metal, but costs, from the standpoint of materials, labor and time, were almost prohibitive.

As an experiment, four of the beaters were coated with a plastisol, manufactured by the Stanley Chemical Co. The results were satisfactory, and Carborundum engineers adopted this method of protection for the beaters.

An old oven was adapted for the job, and set up in the salvage department of the plant. This installation, incidentally, was the major expense of the project.

Coating Procedure

In the coating operation, the beaters are dipped into a solution of plastisol primer, air dried for about 30 minutes, then baked at a temperature of 400 F. While still hot, they are dipped into the plastisol and kept immersed for 20-30 minutes. It is then withdrawn very slowly and again baked for another 30 minutes at 380 F (accurate control of temperature is important).

When finished, the plastic coating is 1/16 to 3/32 in. thick, and constitutes a hard, good-wearing surface over the metal beater.

An angle iron rack was constructed for the air drying of the beaters when they are removed from the primer solution. After the dipping operation is completed, the beater is put under a template and the outer edge is smoothed with a knife to assure the right contour. This is the major precaution stressed by Carborundum engineers—the correct contour must be maintained after the coating, because any rough spots may rub against the tub. When this occurs, the plastisol wears through quickly.

The dipping operation requires about 15 minutes of actual labor and approximately one pound of the plastisol material. The total cost of the operation is only about 2/5 that of previous methods of reconstruction, and added to this savings is the fact that it is seldom necessary to replace the metal beaters. The plastisol is inert to most chemicals and stands up well against abrasion of organic bonds and fillers.

When the plastic wears to the point where the beaters require a new coat, they are placed in a furnace to burn off the old plastic. The cleaned beater then goes through the coating process, and is then stored in the shop as a "spare".

With several "spares" on hand, a coated beater is always available for quick replacement when required.

Fig. 2. Beater is dipped into plastisol primer, then hung on a rack to dry. Equipment shown here is sufficient for the job

Fig. 3. Coated and dried, beater is taken from oven. Hook and bricks support beater so plastisol does not touch oven

Fig. 1. One example of easily-maintained equipment. Rear reflector can be removed without disturbing front reflector

Fig. 2. By slipping heavy stainless steel clip over trunnion bracket relamping is easy and safe; hands are left free

Lamp Maintenance Means More Light

By A. H. RULING, JR., Outdoor Lighting Department, General Electric Co.

MAINTENANCE OF electrical equipment in the last few years has become less of a hit or miss affair and has been superseded by planned maintenance programs. These programs are called various names—preventive maintenance, productive maintenance, etc., but no matter what name the program goes under, it has a common objective—to allow the efficient operation of the equipment being maintained. In some cases it means continuity of operation; in others such as lighting, it means maintaining high level of light output at a reasonable cost.

Maintenance programs in general are divided into roughly three areas: planning, listing of equipment, and execution of maintenance plans. Floodlighting follows this general pattern in that the maintenance should start with the planning of the installation. The equipment should be selected with maintenance in mind. In the long run it is more economical to pay a little more for a unit which is easily maintained and serviced. An example of a light which is designed for easy maintenance is the unit shown in the accompanying photos. These pictures show how easy it is to relamp and clean the unit without tools.

Next step in maintenance is deciding upon the scope of the program, this will be determined by the type of the installation and the importance of continuity of service. For example, installations at ship yards would require a much more elaborate plan than the installation in a plant parking lot. Also the location will enter into it because a location near heavy industry and

Table I. Effects of voltage variations on incandescent lamp characteristics

Indicated Voltage	Per Cent Rated Voltage	Per Cent Rated Light Output	*Per Cent Theoretical Life
99.6	80	48	1900
104.3	85	58	830
108.0	90	70	400
110.4	92	75	300
112.8	94	81	225
115.2	96	87	170
117.6	98	93	130
120.0	100	100	100
122.4	102	105	75
124.8	104	115	60
127.2	106	120	45
129.4	108	130	35
132.0	110	140	30
138.0	115	165	15
144.0	120	190	10

*Based on 100 per cent theoretical life at 100 per cent rated voltage.

Fig. 3. The large opening built into the front reflector makes it easy to insert hands for cleaning inside of lamp

Fig. 4. When tilting is necessary to clean glass, inside lamp, reflector is so designed it will return to original position

railroads will naturally require more cleaning than an installation which is in a suburban area. This, you see, makes it virtually impossible to lay down any hard and fast rules for the maintenance of floodlights. However, tentative standards can be set up in advance when the scope of the program, in accordance with the above mentioned factors, is considered.

After the tentative schedule has been set up, it is usually a good policy to list all the equipment, number all of the lights and poles and list all of the associated equipment such as controllers, voltage regulators, transformers, etc. which may be used in conjunction

(Continued on page 180)

Fig. 5. Installation of wiring can be accomplished without having to remove housing or touching polished surfaces

Fig. 6. Another easy-maintenance feature is this specially-designed socket assembly that is lifted out for inspection

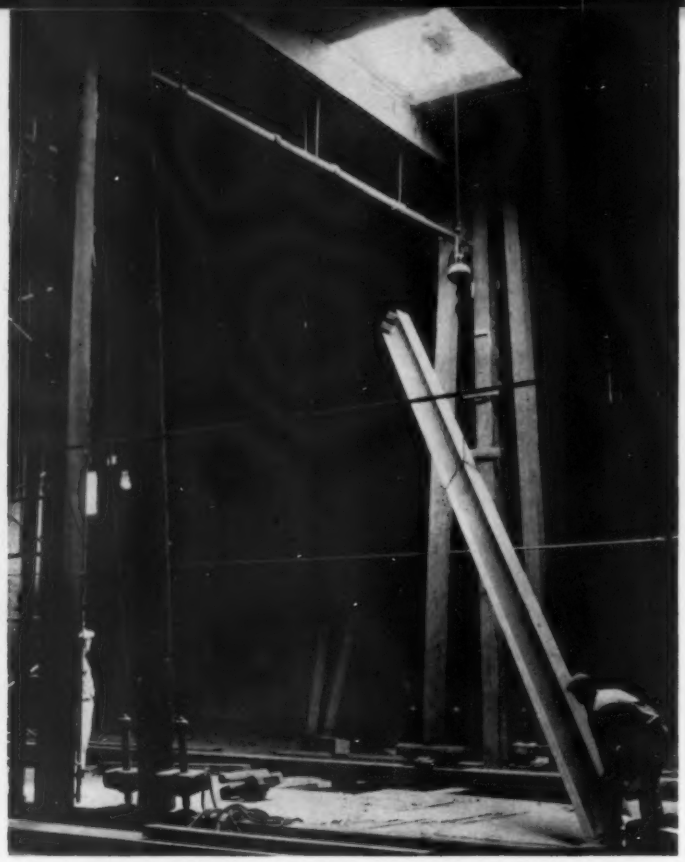


Fig. 1. Member being lowered through roof opening. Note jacks in place

Building Gets New Steel Skeleton

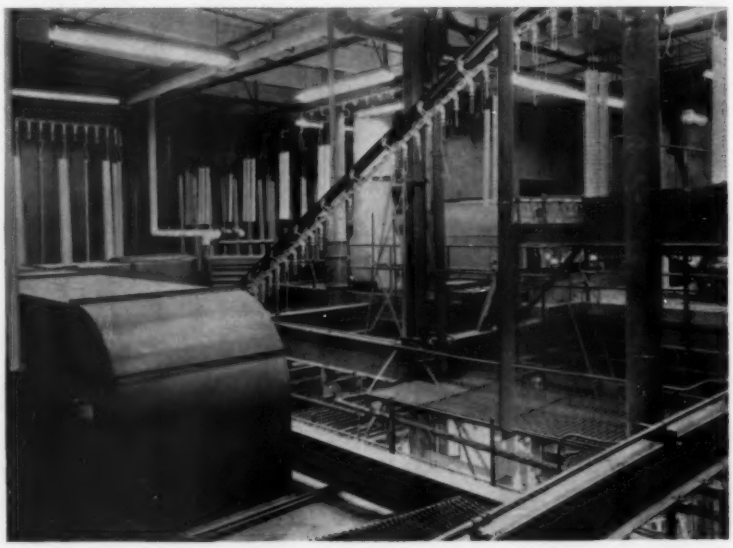
Smithcraft Employs Unusual Method to Replace Wood

ONE WAY to alleviate growing pains of an industrial firm is by simply adding on new facilities providing, of course, that space is available. This approach, however, may not be the most expedient solution in some cases. For example, in Chelsea, Massachusetts, the Smithcraft Lighting Division of the A. L. Smith Iron Co. took care of the demand for added manufacturing capacity by putting new life into old buildings.

Near the company's plant, a box manufacturer was suspending operations in a large mill of about a quarter of a million square feet of floor space. The buildings had been standing for almost half a century and while the brick walls and roofs were in good shape, the interiors were another story. With the aid of consulting engineering firms, exhaustive estimates and plans were made covering phases of building conversion and expanded production facilities. For a while some of the problems seemed insurmountable, leading to proposals of unusual solutions.

One phase of alteration dealt with a mill-type building, approximately 75 ft square and 40 ft high, Fig. 1. The idea was to replace wooden structural members with steel. However, the feasibility of doing this hinged on the adequacy of the existing building

Fig. 2. Second floor view of renovated process building shows new steel in place



footings. Tests indicated that they were satisfactory.

In the process of strengthening the buildings, holes were made in the second floor. Temporary timbers were placed over the top of the old floor and run across the openings. Through these, temporary columns were brought to bear against the timbers. Temporary columns were also placed under the old floor girders so that they could later be cut away from the wooden columns.

Screw jacks were placed on top of the temporary timbers and extended at an angle to the top of the old wooden columns. See Fig. 3. These jacks picked up the roof load from the wooden columns and permitted workmen to go ahead with steel replacements. The steel column sections were delivered inside the building through the roof by means of a mobile crane. When the new steel column height reached about 18 ft, the approximate elevation of the new floor, lateral members were installed, giving the building needed rigidity. All the steel members were in place before the wooden members were removed.

Conversion of one of the larger buildings for the purpose of steel storage included the placement of concrete flooring of exceptional compressive strength with a maximum of about 13,300 psi at 28 days. See Fig. 5. The decision to put down such a strong floor was based on the experience with this type of concrete in two other locations in the firm's plant. After some 7 years of service, the floors at these locations had shown good wear resistance.

Preparation for this floor entailed a lot of digging. The old structure had a dirt floor and the half a century of accumulation of peat had to be removed 8 to 12 ft deep to establish a solid bed for the granolithic floor. See Fig. 4.

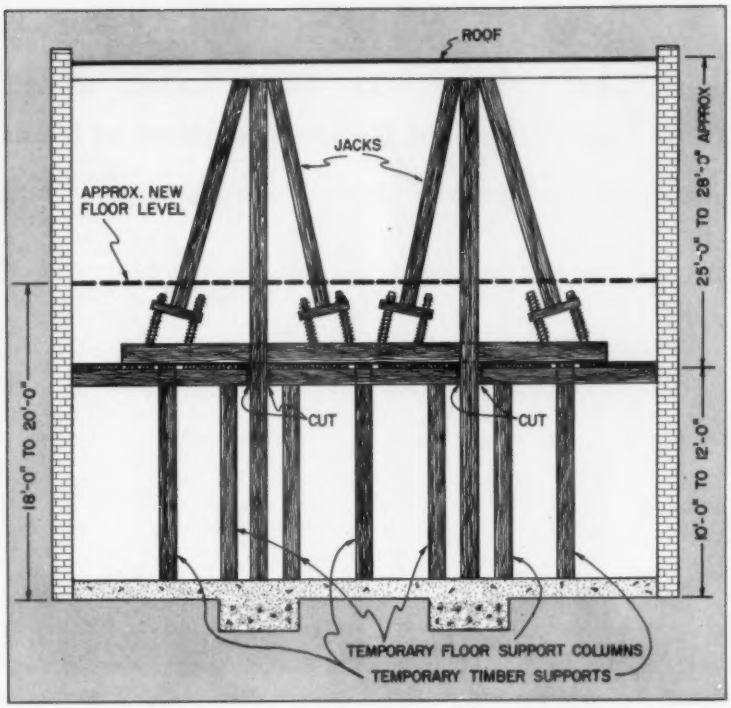


Fig. 3. General idea of ways supports were used to change from wood to steel

Actual placement of the floor by the contracting firm was closely supervised. The mix was put in very dry, using about 3 gallons of water per bag of cement. Practically all of the test samples of the mix had a slump of zero. There was no special admixture used but the aggregates were watched and had to meet specifications. Samples of aggregates were taken on the job site and were analyzed according to ASTM standards by a materials technologist, working in a consulting capacity. This floor has been under hard use since it was put in and has been standing up well.

These are just a few of the projects of the overall job of changing old facilities into new.

Fig. 4. Debris accumulation after old flooring was demolished

Fig. 5. New concrete floor has a high wear resistance proper

"Extra" Man for the Plant Engineer

He's the Industrial Representative of Your Local Utility

By GEORGE H. HOFFMAN, Industrial Power Representative, Baltimore Gas and Electric Co.

MOST PLANT engineers will agree that they could use another man on their staff, but what type of man would they choose? Someone with engineering training? One familiar with the problems associated with operating an industrial plant? One who can assemble installation cost estimates and estimate savings that will accrue from a proposed improvement? A man who can help convince the management of the advisability of a sound electric wiring improvement program? For assistance with problems such as these, the plant engineer can look to the industrial representatives (power salesmen or similar title) of his local public utility.

Since these men spend a large part of each day helping solve problems touching on many facets of plant operation—lighting, wiring, electric heating and materials handling, motor applications, power factor correction, etc. —they have the experience to help the plant engineer with many of his problems. In addition, most power companies maintain a staff of specialists to back them up with advice on plant distribution, switchgear, lighting, air conditioning and other specific uses of electric power.

In order to obtain the greatest assistance possible, the plant engineer should see that the utility man is thoroughly familiar with the plant and the processes employed. The time spent in showing him around and explaining procedure may pay dividends in suggestions and engineering assistance. Also, it is wise to call on him when changes or projects are in the planning stages, for he can offer the maximum help when given sufficient time to conduct a study or consult specialists.

Since each power salesman calls on many industries, it is seldom possible for him to devote extended periods of time on any one project continuously. Where necessary, special arrangements can be made to permit this, but he is not in a position to perform the services of a consulting engineer.

The industrial representative should know as many of the key personnel in the plant as possible, since this permits him to help the plant engineer in presenting a project to management, or to the operating personnel concerned. An invitation from the plant engineer for him to attend meetings where a proposition is being discussed will frequently mean that he can help advance the project.

In order that the power man can talk the financial language of the company and assign proper value to the advantages of a proposition, he should be apprised of the company's economic policies. Be assured that he will hold these and any other matters so entrusted to him in strict confidence.

To assist the plant engineer, the power salesman will help plan a test to prove the economics of the new equipment. He will assist in seeing to proper installation and operation of equipment. Sometimes bugs will develop which he can work out with the plant engineer. In short, his job is to help his customers obtain the most effective and economical use of electric power.

The case histories that follow give a cross section of the type of assistance available to the plant engineer from the power salesman.

Power factor improvement. An industrial plant with a large percentage of motor load had an overloaded condition at one electric distribution center. Bids were asked to increase the wiring. The plant engineer discussed this problem with a public utility representative, who arranged for a test that disclosed the extent of overload and also revealed very low power factor. He recommended that capacitors be installed.

At a meeting with the plant manager, the power man explained the effect of the proposed capacitors and the other advantages. The installation was made, the wiring increase was obviated, the power factor of the plant and the voltage regulation improved. (See Fig. 1.) The saving in wiring about offset the cost of the capacitors.

Wiring planning. During a routine visit, a power salesman received word from a plant engineer that the firm was planning a branch plant. Together they surveyed the proposed building, (even before the lease was signed) and put together a rough estimate of cost to install the electric facilities. When management asked for an estimate, the plant engineer was ready; when the lease was signed, the project moved to completion in record time.

In another case, the plant engineer for a paint manufacturer, with home offices in another section of the country, worked with the power salesman to devise a wiring system that would utilize the existing wiring to the fullest

(Continued on page 182)

Fig. 1. Capacitors were installed at suggestion of utility representative to correct overload condition and low power factor at one electric distribution center

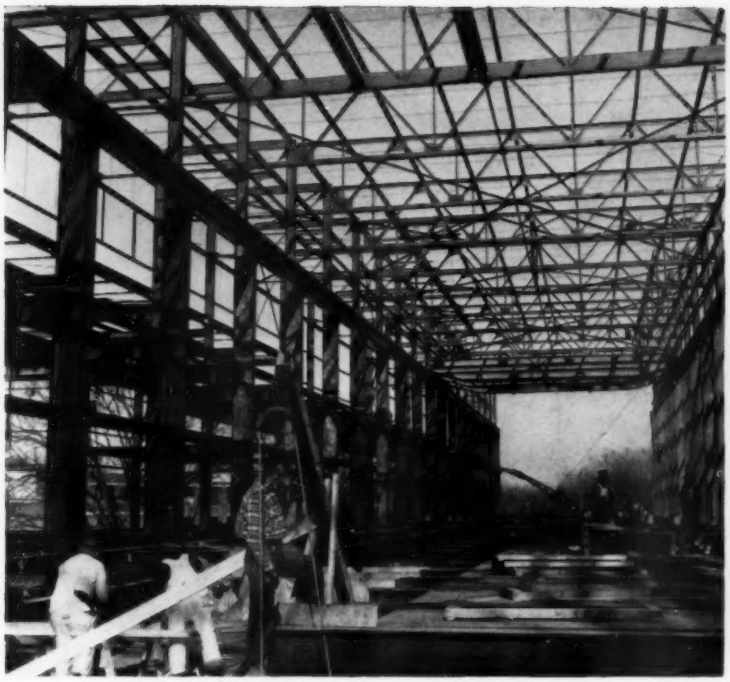


Fig. 1. The problem presented in erecting the steel framework for a new paper mill was: How can we control vibration from operation of heavy machinery?

Fig. 2. The answer was the use of high-tensile bolts to secure framework

Bolts Solve Vibration Problem

New Paper Mill Will House Heavy Machinery, Overhead Cranes

High tensile strength bolts which transfer the joint forces from member to member by friction instead of by shear or bearing are helping this paper mill control its vibration problem

TWO THOUSAND TONS of papermaking machinery posed a tough vibration control problem for the Belmont Iron Works, Philadelphia, in erecting steel for a new 151,000 sq ft P. H. Glatfelter Co. paper mill in Spring Grove, Pa.

One piece of equipment going into the plant is a 188-in. wide paper machine, capable of producing 14-ft widths of paper at a rate of 2000 fpm. Other automatic equipment measures and blends various types of fibrous stocks, fillers and additives to the machine, which turns out 300 tons of paper per day in 5-ft diameter rolls. Finishing operations convert these rolls of high grade paper into smaller rolls and sheets ready for the printer. Most of it will be used for books, tablets or envelopes.

Over 430 ft long and weighing close to 2000 tons, the paper machine is located 20 ft above ground elevation. It subjects the steel frame to dynamic loading from pulsating stresses, plus the static load of its own weight.

Running a close second in producing stresses on the steelwork are the heavy cranes. Maximum lift on the largest crane is 30 tons, accomplished with two 15-ton hooks working from a bridge crane of 50-ft span. In addition to the static loading from its dead weight, the crane produces dynamic loading with both transverse and cyclic stresses. Other heavy equipment contributing to the vibration problem includes 5- and 10-ton refiners, and the rolls in the calender stacks, which are 36 in. in diameter and weigh 30 tons.

To combat this accumulation of stress-producers, engineers from the J. E. Sirrine Co., Greenville, S. C., investigated a technique that proved successful in ore unloaders and railroad bridges, where similar stresses are encountered. On the recommendation of Russell, Burdsall & Ward Bolt and Nut Co., Port Chester, N. Y., high tensile strength bolts were specified for all primary connections in joining the structural members.

While bolts in the structural field are not new, the principle of high tensile bolts is. The high clamping force of the high tensile bolt transfers the joint forces from plate to plate or from member to member by friction instead of by shear or bearing.

By transferring failure point from the net to the gross section, the high tensile bolts strengthen the joints against fatigue, tension and other applied stresses. Also, where changing loads are encountered, bolting eliminates the hole effect—where two loosely joined members slip against each other, setting up shear stresses on the fastener. Because of these advantages, the high tensile bolts were chosen.

This plant is 615 ft long, with an average width of 100 ft and an average height of 60 ft. Comprising three floors, the building contains 200 tons of steelwork and 8000 cu yd of concrete. Outer walls are brick and aluminum siding, with horizontal separating panels of plastic to admit light. General contractor was R. S. Noonan, Inc., York, Pa.

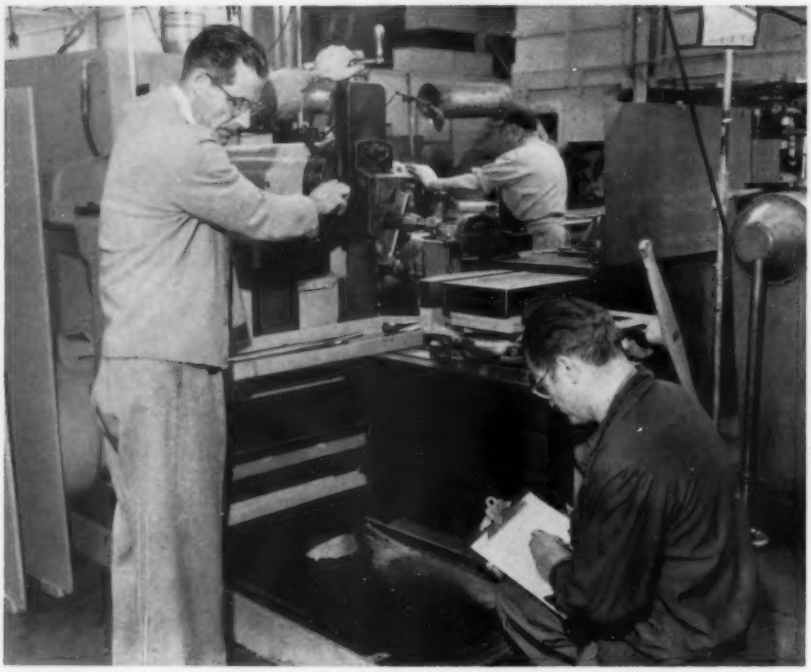


Fig. 1. These two men—members of the machine-evaluation team—survey all the machines in the shop to determine whether or not it would be economical to rebuild them

Kit System Rebuilds Machines

Machines Are Back in Production in 10 Days

IT'S AN OLD—and all too familiar story! A machine tool is red-tagged for overhaul. The machine is taken out of production. Two months pass before the repair parts arrive. Even then one or two vital parts are missing. Three months pass before the maintenance department can even begin the rework. Four months from date of "pulling," the machine is back in production.

But at Consolidated Vultee Aircraft Corp., with a unique machine repair speed-up program, standard rebuilt tools are seldom "down" more than 10 days. Why? Because their maintenance department has come up with what it calls the kit system. A material kit is ordered for every machine due for rebuild. The machine stays on the line, in production, with temporary adjustments and repairs, until all parts are in stock—until its repair kit is complete. Only then is the machine taken off the line.

Last year a machine-evaluation team surveyed the San Diego plant's 2500 machine tools. Every machine was case historied and its condition detailed on the form, Machine Tool Inspection Report and Inspection Review.

The two-man survey team, including a top mechanic and supervisor of machine tool rebuilding, spent upwards of four hours per machine. They noted whether the machine was in "same as new condition"; whether it was "good," "fair," "poor" or in need of replacement. Part-by-part, the team surveyed every machine, checking some 26 items, among them the wear and alignment of carriage ways; cross feed screw and nut wear; power shafts; bearings; gears; and operation of controls.

The team's primary function was to inspect the machines and, from their present condition, determine whether the machines could be rebuilt or if they should be declared surplus. From the inspector's findings, the shop supervisor detailed cost estimates on all machine tools requiring rehabilitation. It is also his job to write up the repair kit list, submit it to the Work Control section, which orders the kit components and monitors their delivery dates.

Convair's rule of thumb: if labor and material costs exceed 60 per cent of the machine's current value, replacement, not rebuilding, should be considered.

Advanced rebuild scheduling, keyed to the repair kit system, permitted the company to rework a total of 180 machines during 1955; this year will see them rebuild 240 machines, probably more. The company hopes to, within a period of years, rework or completely rebuild every production machine needing it.

The evaluating team and kit system are but segments of the rebuild program. Each machine shop is assigned a top plant engineering mechanic. He is responsible for about 100 machines, and his main job is to correct minor faults before they become major ones. He runs a daily check on every machine under his control. He becomes so familiar with the machines that he can spot numerous faults solely by hearing them in operation.

At present, the company has six such skilled mechanics assigned to the plant's four major machining departments.

Superintendent of Maintenance, J. W. Vint, feels that: "It's not enough to launch a machine rebuild program, with but a single evaluation team. You need men in the shops, constantly checking on machines. Even after

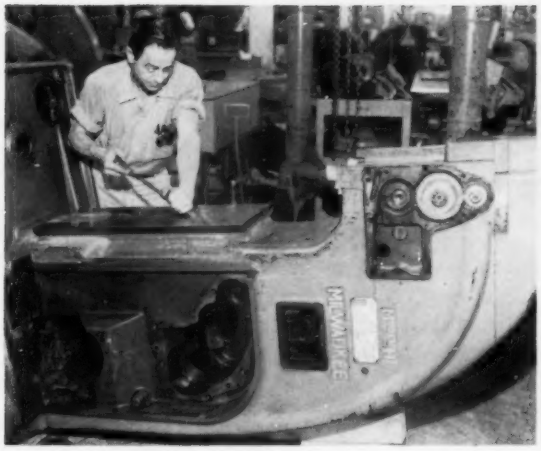


Fig. 2. This milling machine has been called in for rebuilding. It will be cleaned and completely rebuilt for $8,000

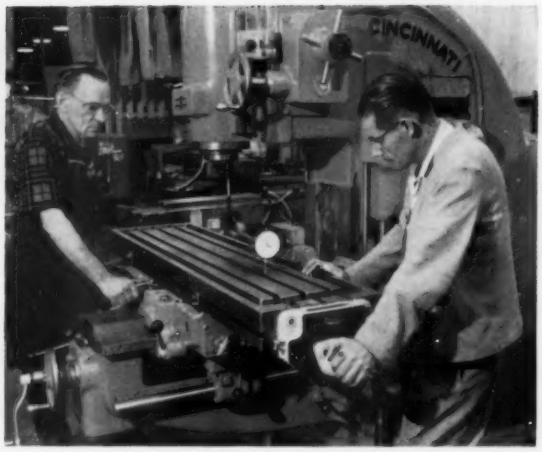


Fig. 3. After a machine has been rebuilt, it is inspected by machine-evaluation team before it is put back on the line

they're out of rebuild, and returned to production, they often need adjustments. That's the job of our machine specialists. They are the liaison between the men on the machine and plant engineering."

This rebuild program allows the plant engineering department to predict machine tool life and estimate when a machine will need replacement. In this, the plant engineering department works closely with production, which has final say as to whether a machine can be expected to keep the production pace (and hold tolerances).

J. W. Vint does not recommend continuous rebuilding. When a machine has been rebuilt for the second time, it is unlikely that tolerances can be held (replacing but 60 per cent of parts) on the third rebuild. But until that final, and crucial rebuild, Vint expects 100 per cent "like-new" condition — and high tolerances — from every rebuild job.

With 24 specialists in the big rebuild shops, plant personnel handles the work whenever possible. For one thing, some tools must be reworked right on the production floor. For another, the company's heavy work load and close tolerance requirements make it advantageous to rebuild in the plant, close to production.

Interestingly, too, are the powers of "shut down" placed in the hands of maintenance's roving machine specialist. They have the right to shut down a machine if it is being used improperly—to the extent that continued use in that condition could cause breakdown. This may occur if a machinist is using the wrong cutter or if the specialist considers the machine seriously overloaded.

The kit system—which sees no machine pulled off the line until all needed parts are on hand—has proven to be a big economy. It is not necessary to maintain an extensive stock inventory. All that is required is to order the kits. All parts are ordered against a specific work order for a specific machine.

Rebuilding by the kit system, the company finds that it is: 1. Saving more than 40 per cent against cost of a new machine; 2. Cutting standard machine down-time from 4 to 5 months to an average of 10 to 12 days, with relatively few jobs requiring removal of a tool from production for more than 30 days; and 3. Reducing rebuild costs because only small quantities of parts need be ordered.

Here is a capsule description of the kit system and rebuild program: 1. Preventive Maintenance Section prepares initial Machine Tool Inspection Report and Inspection Review on all machine tools.

2. The shop supervisor prepares cost estimates on all machine tools scheduled for rebuild or preventive maintenance.

3. The condition of the machine and the cost of rehabilitation are reviewed by the superintendent of maintenance based on machine replacement cost and production factors.

4. Machine tools requiring rebuild are scheduled for overhaul (on the master schedule).

(Continued on page 184)

Fig. 4. The efficient operation of a kit machine repair system depends on a central control file and an equipment analyst to coordinate all of the activities

Fluid Power Maintenance
II. Selection of Proper Fluids

In this second of the series the authors tell what to beware in selection of hydraulic fluids. What can happen if you mix different types of fluids, necessity for maintaining extreme cleanliness, what the important qualities of a hydraulic fluid are, what effects they might have on parts of the hydraulic system

By H. L. STEWART and J. M. MORITZ, Logansport Machine Co., Inc.

FLUID USED IN a hydraulic system is pretty much decided by the components selected by the designer. Maintenance men should make a careful selection of the grade or type of fluid if they expect to get satisfactory results from the system. So often we find that a failure in a hydraulic system is caused by the use of an improper fluid. For example, a customer had a machine tool with a hydraulic system. On the machine tool was a system for feeding coolant to the workpiece during a machining operation. He found that he was having trouble with the coolant getting into his hydraulic system so he decided to eliminate the hydraulic oil and use coolant in his hydraulic system. The results are obvious.

There are a number of fluids used in hydraulic systems — raw water, treated water, hydraulic oil, aqueous-base fluid, and non-aqueous base fluid. Water was used in the very early hydraulic systems and is still used today in some of the large hydraulic installations. The water pressure is directed to the individual circuits from a central station.

While water in itself is not an expensive commodity, it can become quite costly in a hydraulic system. Untreated water may contain lime or other chemicals which can quickly foul up the precision parts of valves, cylinders, and other components. It is extremely difficult (in fact nearly impossible) to design components that will withstand the passage of small particles suspended in the water moving at a high velocity and high pressure.

Water moving at high velocity through the system has an erosion effect on the bodies of valves, and pistons of cylinders especially if they are made of bronze or similar alloys. This is known as "wire drawing." Water actually cuts grooves in valve bodies from one land to another resulting in excessive leakage and high maintenance cost.

Water hydraulic systems are found mostly in rubber processing plants, die casting plants, and in some steel mills. In sealing the piston of a cylinder for high pressure water service it has been found that a non-metallic seal usually gives longer service. These include cup packing, U-cups, and chevron-type seals.

Maintenance costs on water hydraulic systems are usually quite high. This has greatly discouraged the use of this type of fluid in many of our high production plants. The components which make up the system are much more expensive for water than they are for oil. Valves and cylinders for water service may cost several times as much as they would for oil service; and their service life usually is not nearly as long.

Hydraulic Oil

When selecting hydraulic oil it must be remembered that the most expensive oil may be the cheapest in the overall picture. Just don't use any oil but select one that will meet the requirements of your application. The most important service property of a hydraulic oil is viscosity. If the viscosity is too low pump efficiency will be reduced due to slippage and heat will develop; internal leakage will increase in valves and cylinders; external leakage often develops; increased rate of wear on moving parts i.e., valve pistons, cylinder pistons, etc.; and control problems will develop at points like flow control valves.

If the viscosity of the oil is too high the operation of the system will become sluggish as in a system operated in low temperatures; increase in pressure drop throughout the system; and increase over normal power consumption. Viscosity also has a bearing on the noise level of the system. There is a specific oil viscosity range in any hydraulic system which will assure the best results. Most systems operate most efficiently in a range somewhere between 135 SSU and 315 SSU depending upon temperatures, pressures, types of pumps, etc. Generally the pump is the most critical component in the system in regards to viscosity.

Other important service properties of oil are viscosity index, oxidation stability, demulsibility, lubricity, and corrosion and rust preventive qualities.

Additives are used in many hydraulic oils in order to improve their operational characteristics. These may be used for improving lubricating qualities, corrosion resistance, and to increase oxidation stability. When a system is idle for a period of time after it is run at fairly high temperatures, moisture often forms, causing rust. Also in hydraulic systems which are not kept tight, water or coolants may get into the system. These, too, can cause rusting. Additives in the oil help prevent this. Additives should be added by the oil manufacturers, not the users. The manufacturers have necessary knowledge to use the correct amount of additives. Too much of any additive can cause serious trouble in the hydraulic system.

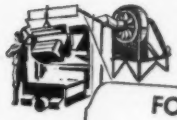
Another factor that definitely affects oil performance and also system performance is foaming. Foam may be caused by certain conditions in the system which produce aeration of the oil; by slow release of air bubbles due to faulty reservoir design; and by the use of certain additives.

Remedies for helping to correct foaming action are; use of anti-foam agents (a synthetic organic chemical administered in very small quantities); redesigning of the baffles in the reservoir; eliminating leaks in suction line; correcting any faulty valve operation; and maintaining correct oil level in reservoir.

Handling and storing of hydraulic oil is usually a function of the maintenance department. Good housekeeping is very important. First, hydraulic oil must be stored in a clean, dry location. Oil spilled on a floor not only is a fire hazard but workmen are liable to have

Is One of These Your Dust Problem?

Check this list of AAF Dust Control Equipment applications covering a typical *one month* period.



CHEMICALS

Rotary Kiln
Drum Dryer
Ball Mill
Bagging
Hammer Mill
Rotary Dryer
Material Handling
Fluid Energy Mill

FOUNDRY

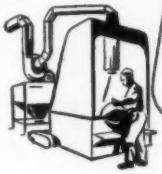
Sand Conditioning System
Swing Frame Grinding
Electric Furnace Fumes
Portable Grinding
Vibrating Shakeout
Cupolas

MINING AND ROCK PRODUCTS

Copper Ore Milling
Quarry Drilling
Zinc Concentrate Dryer
Bituminous Aggregate Dryer
Calcining Furnace
Coal Cleaning Plant
Underground Crusher
Taconite Ore Crusher
Coal Dryers
Coal Tipple

METAL WORKING

Thread Grinders
Metalizing
Magnesium Grinding
Belt Sander
Stand Grinding
Burring
Automatic Screw Machines
Automatic Buffing
Cast Iron Machining



MISCELLANEOUS

Woodworking
Grain Bins
Paper Dust
Leather Brusher
Laundry Dryers
Fur Cleaning
Plastic Dust
Candy Mixers
Rayon Flocking
Rubber Grinding
Sugar Granulator
Cream Cheese Concentrator
Ceramic Insulator Grinding

Any of the above "ring a bell"? If not, remember this list represents only *one month* in AAF's 23 years of dust control experience—all of which is readily available to help you find practical solutions to your dust problems. Why not call your local AAF representative now, or write—

Air Filters and Precipitators

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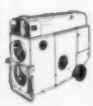
Herman Nelson Unit Heaters

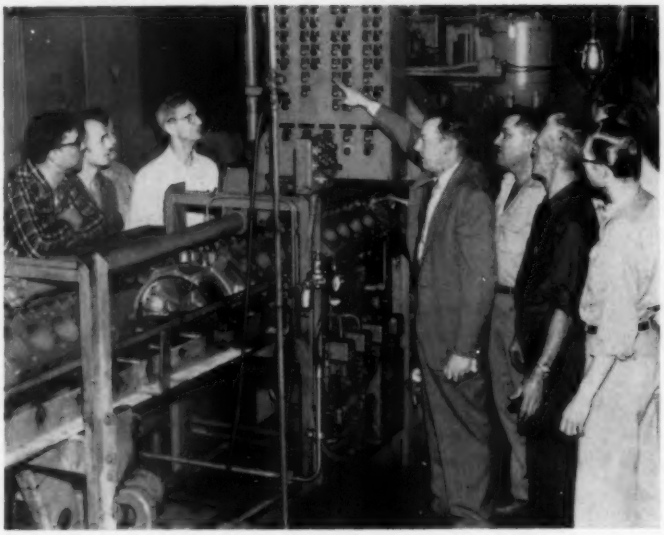

Herman Nelson Portable Heaters

For more facts circle 564 on Reply Card

How Packard Is Meeting the Need for Skilled Hydraulic Maintainers

According to information received from Packard-Clipper Division, Studebaker-Packard Corporation, there is a general industry shortage of skilled hydraulic maintenance men. Reason behind the shortage is the ever-increasing amount of complex automated machinery. The Company has, therefore, instituted a 40-week planned preventive maintenance program at its engine and transmission plant in Utica, Mich.

Shown in the photograph is Marshall Swisher, center, supervisor of hydraulics at the Utica plant. Here he instructs members of the first hydraulics maintenance group. Sequence of automatic operations by hydraulic actuation is indicated by lights on the control panel at which Mr. Swisher is pointing.



some bad falls. If oil drums are allowed to sit out in the weather, water may collect on top of the drum and work its way inside through the seal.

It is a good idea to install spigots on the oil drums and store the drums on their sides on a platform built up high enough above the floor so that oil cans can be placed under the spigots and so that it will be easy to clean under the platform. This will eliminate an accumulation of oil on the floor. Second, before opening a drum of oil be sure that the opening is free of any contaminants and that the spigot is also clean. Third, do not mix different types of hydraulic oil. Each may have certain properties or additives that will not suitably mix. Fourth, use clean containers when transporting the oil from the drums to the hydraulic system.

Make absolutely certain that no lint, dirt, or water is present in the containers. Oil containers cleaned out with rags or waste often collect lint. This lint may not be immediately noticeable but when it collects in the oil and is poured into the power unit it can quickly clog the filter. Fifth, do not allow hydraulic oil to sit around in open containers. It will quickly collect dirt, lint, and other foreign matter.

Sixth, before filling the hydraulic system, be certain that the filling equipment, such as funnel, hose, etc. is perfectly clean. Seventh, run periodic tests on the oil in your hydraulic systems. Have your oil supplier help you. Eighth, change oil at regular intervals. This will get rid of dirty, contaminated oils. How often the oil should be changed depends pretty much on the severity of service.

There are case histories showing that hydraulic systems have failed completely because the oil was not changed at regular intervals and sludge, dirt, and other foreign matter formed clogging filters, and ruined the precision parts of pumps, valves, and cylinders. Cleanliness is a must when working with hydraulic oils.

There are a number of "musts" in a good hydraulic oil such as; have long service life; protect system against rust and corrosion; have maximum lubricating qualities to assure long life of components; retain its original properties under operating conditions, produce an absolute minimum of foaming; remain stable, resisting oxidation and deterioration over long periods; have high viscosity index which resists change in viscosity as temperature changes; and have the right viscosity so that pressures can be correctly maintained. Choose a good oil; it will pay dividends.

Fire Resistant Fluids

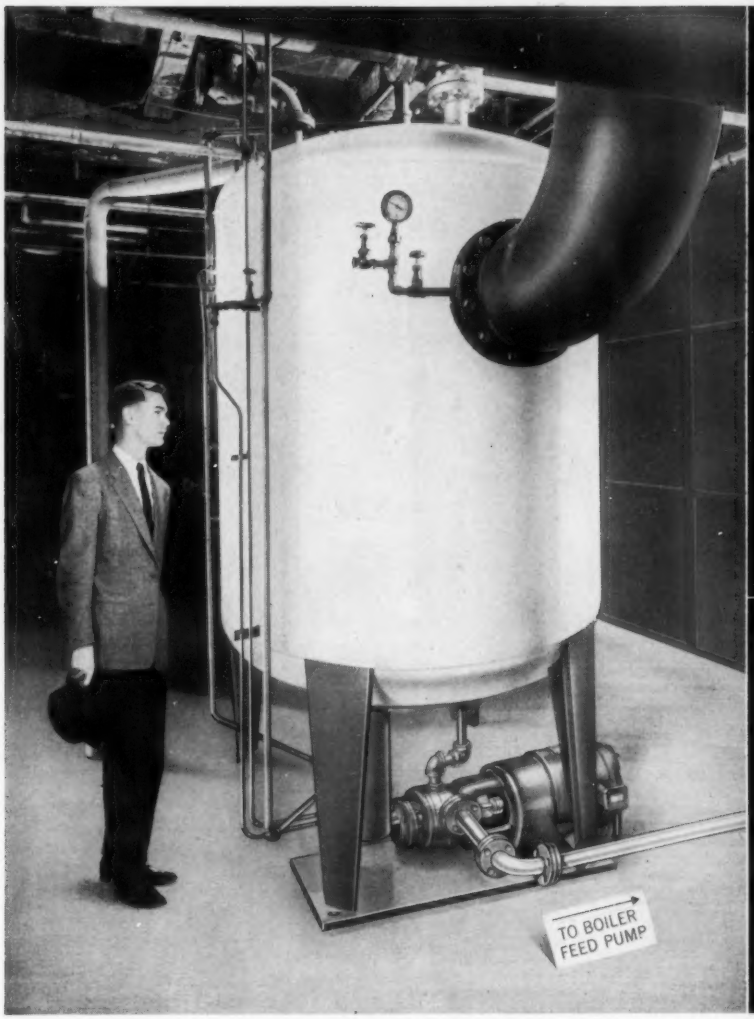
Use of fire resistant fluids has become commonplace in the past few years. Users of hydraulic equipment have been made conscious of the fire hazards that are possible when using petroleum base fluids operating at high pressures and temperatures around blast furnaces, die casting machines, and in other "hot spots." Two categories of fire resistant fluids are now generally used in industry; they are aqueous-base, and synthetic mixtures. Aqueous-base fluids contain inhibitor and additives which take care of corrosion and give the fluid lubricity and anti-wear qualities. The fluid also contains a glycol-type thickener and a large amount of water. Water in aqueous-base fluids is close to fifty per cent. This alone tends to make them fire resistant.

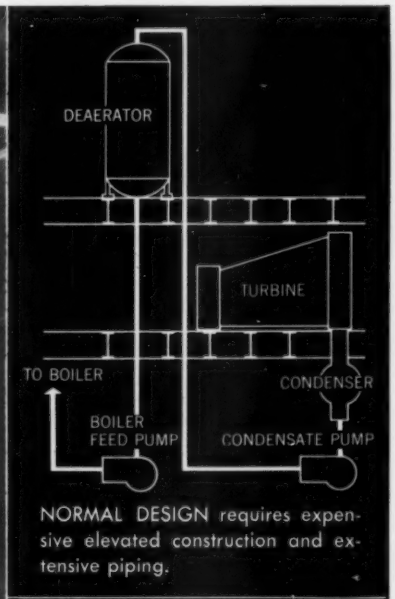
It has been found that a good operational temperature for aqueous-base fluid is around 125 F. When temperatures exceed 150 F some difficulty may be encountered with evaporation of water and certain inhibitors. Loss of inhibitors will have a direct effect upon the system.

Aqueous-base fluids will attack some materials. They have a definite effect on some paints which are used on the inside of power devices, on cored passages of valves, and on the inside of the covers of cylinders. The fluid will soften or lift most paints that petroleum base fluids will not effect. Particles of paint can quickly cause trouble with filters, pumps, valves, and cylinders. Special coatings, such as lacquers and enamels, have been developed that will not be affected by the aqueous-base fluids.

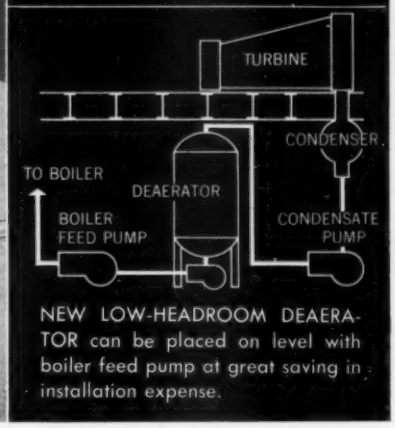
When using an aqueous-base material be sure to check with the supplier to find out the action of his particular material has on zinc, cadmium, and other materials. It has been found that this type of fluid has little effect on synthetic packing materials and leather. The same type of packing as used with hydraulic oil is usually suitable with this fluid. The synthetic mixtures or non-aqueous base fire resistant type

(Continued on page 178)





NORMAL DESIGN requires expensive elevated construction and extensive piping.



NEW LOW-HEADROOM DEAERATOR can be placed on level with boiler feed pump at great saving in installation expense.

New low-headroom deaerator makes oxygen removal economical for the smaller plant

Now every plant, large or small, can cut steam plant maintenance . . . and do it economically . . . by using deaerators. A new "low-headroom" deaerator, just developed by Worthington, allows you to install the unit *inside* your power house. You don't have to pay for expensive elevated mounting and complicated piping!

To provide adequate water pressure, it used to be necessary to elevate the deaerator above the boiler feed pump intake. A small pump on the new "low-headroom" unit now furnishes this pressure without the need for elevation. Result: considerable saving on installation and piping.

A patented* recirculation system prevents vapor-binding and provides means for preheating and deaeration before start-up. It gives you maximum oxygen removal even under abnormal operating conditions.

Available in standard sizes up to 80,000 pounds per hour, and larger in "tailored" designs, the new "low-headroom" deaerator can be installed in your plant in a matter of weeks. For more information call your nearest Worthington District Office or write Section S63, Worthington Corporation, Steam Power Department, Harrison, N. J. In Canada: Worthington (Canada) 1955, Ltd., Toronto, Ont. S.6.3

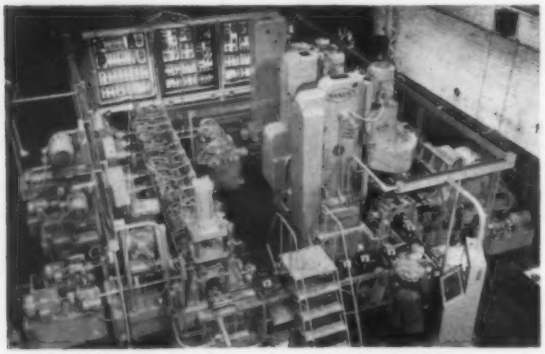
WORTHINGTON

*Patent No. 2308719-20 & 21 2564583 — other patents pending

For more facts circle 565 on Reply Card

Automation Invades the Valve Industry to Produce Valve Bodies

MASS PRODUCTION of precision-machined valve bodies is provided by a unique transfer machine, according to Manning, Maxwell & Moore, Inc., who will use the machine in Watertown, Mass., to manufacture Hancock gate type high-pressure steel valves. Engineered and built by Baker Bros., Inc., at a cost of more than $250,000, the machine represents the first time that many of the principles of automation have been applied in the valve industry.



The transfer machine, replacing six other machines of various types, requires only one operator. It averages about 73 finished valve bodies an hour (depending on size) compared to 19 per hour produced by old methods.

Completely automatic, the machine is operated from a master control board. When the machine is fully loaded, 30 platens, each carrying a rough forging of a valve body, pass through a total of 26 stations. There are 10 drilling, 4 reaming, 6 tapping, 2 precision boring, 2 facing, 1 counterboring and 1 broaching operations which occur simultaneously when the machine is cycled.

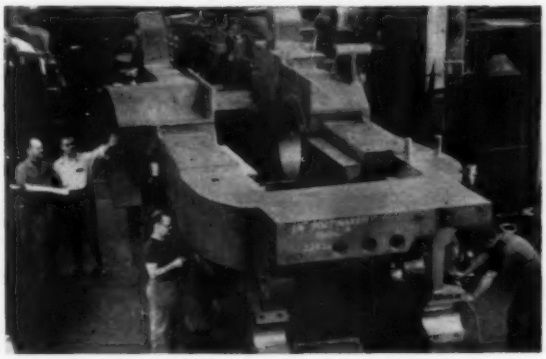
All chips from the forgings are disposed of automatically by conveyor, and all moving parts are lubricated automatically by a central lubricating system.

Cold Forging Machines Get to the Giant Size with New Boltmaker

BIGGEST COLD-FORGING machine ever designed, the world's largest boltmaker is being built for the Cleveland Cap Screw Co. by National Machinery Co., Tiffin, Ohio. Twelve feet high, weighing 196 tons, the boltmaker will draw raw stock—$1\frac{7}{16}$-in. hot-rolled steel rod—down to size and produce cap screws $1\frac{1}{4}$ in. in diameter, 10 in. long, at rates up to 40 a minute. The screws will weigh about five pounds each, and the machine will consume a ton of steel every 10 minutes.

Drawing the steel rod to size, the boltmaker cuts off the stock in proper lengths, extrudes the blank, heads, trims the head, points the end and rolls the threads on, all automatically.

In operation, the machine will be tended by three men at the control positions—one at the drawing end, the second at mid-machine and the third at the thread-rolling end.



Blimp Hangars Get New "Topping" of Lightweight Aluminum

TWO MASSIVE, parabolic-shaped blimp hangars at the Naval Air Station, Lakehurst, N. J., built of timber during World War II, are the base for anti-submarine blimp operations along the Eastern seaboard.

To solve roofing problems which have been chronic with the huge hangars, Wigton-Abbott Corp., Plainfield, N. J., was retained by the Chief, Bureau of Yards and Docks, U. S. Navy.

The two structures cover 640,000 sq ft, stand 175 ft high, and have a roof area of nearly one million square feet, the side walls being considered part of the roof.

The design problem presented to the engineers was one of finding a low-cost roofing system with ease of application, low cost of maintenance, and one that would stay tight, even in hurricanes. After exhaustive testing, Wigton-Abbott recommended an aluminum roof system.

Contractors for the project stripped the hangars clean of all old built-up roofing, including sheathing damaged by leaks from previous roof failures. After replacing the sheathing where necessary, 30-lb asphalt impregnated asbestos felt was fastened directly to it. This was followed by .032-inch mill-finished corrugated aluminum roofing sheet. Stainless steel lag screws were used to secure the new roof to the deck.

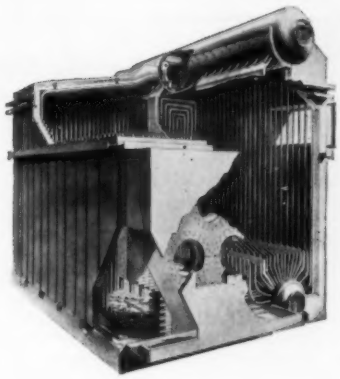
Rolled and corrugated at Aluminum Company of America's Alcoa, Tenn., works, the aluminum roofing sheets are 48 in. wide, with corrugations $\frac{7}{8}$ in. deep on a pitch of 2.67 in.

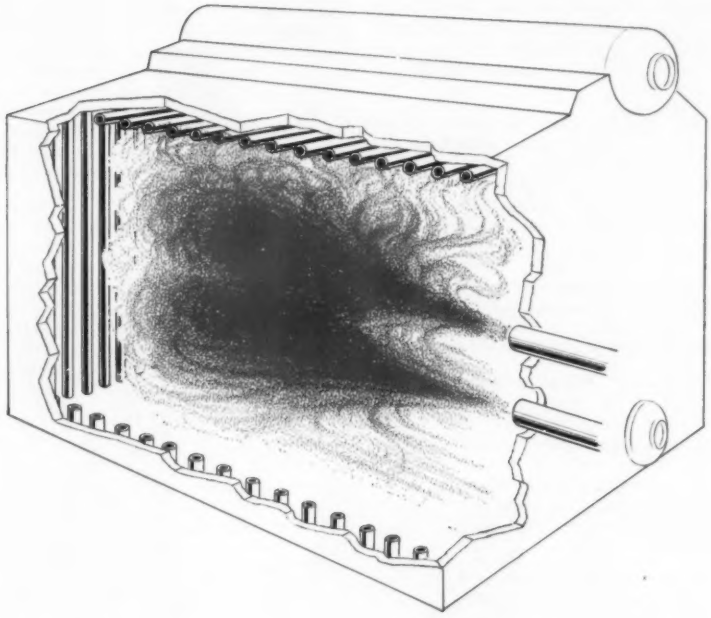
Weight of the system totals 0.96 lb per square foot. The aluminum sheet weighs 0.64 psf with overlap weight included, the felt 0.30 psf, and the fasteners 0.02 psf. When completed, a total of 520,138 lb of aluminum will have been used on the buildings.

Another Feature of the FW Series "SC" Standard Boiler

EFFICIENT FIRING ARRANGEMENT

assures Longer, Trouble-Free Service





Simplified, schematic diagram showing firing arrangement of typical "SC" steam generator.

The furnace arrangement is carefully designed to permit excellent combustion of the fuel without impingement of the flame on any of the tube surfaces. This prevents harmful overheating and contributes to longer, trouble-free performance.

The rear wall of the firing chamber is over 19 feet from the burner wall, permitting long, horizontal flame travel. The flame envelope, as indicated above, occupies the major portion of available furnace space, greatly reducing ineffective or unused furnace volume. This same basic combustion principle has provided years of successful operation in many other types of FW boilers.

FW Series "SC" Steam Generators are available in capacities from 50,000 to 150,000 lb/hr, for pressures to 1500 psi and superheated steam temperatures to 950 F.

For further information, write for Bulletin B-55-4. *Foster Wheeler Corporation, 165 Broadway, New York 6, New York.*

OTHER FEATURES AT A GLANCE

- Completely water-cooled walls
- Unrestricted circulation
- All-welded casing
- Fully drainable superheater
- Efficient convection surface
- Bottom supported unit
- Steam purifying system
- Full insulation

FOSTER WHEELER

NEW YORK • LONDON • PARIS • ST. CATHARINES, ONT.

For more facts circle 566 on Reply Card

NEW PLANT CONSTRUCTION — advance information on location, costs

Fontana, Calif.—Kaiser Steel Corp., 1924 Broadway, Oakland, Calif., has announced plans for a major expansion of its Fontana Steel Mill near here. Work will begin soon and be completed by spring of 1958. Production expansion will cover the steel plate, tin plate, hot rolled sheets and structural steel lines. Cost of the expansion program is expected to total $113 million.

Puente, Calif. — Pioneering Manufacturing Co., Los Angeles, Calif., plans to construct a new plant with 175,000 sq ft of floor space on a 29-acre site. Construction will begin in the early fall and is expected to be in partial operation by summer of 1957. New plant will cost about $1 million.

Rifle, Colo.—Union Carbide & Carbon Corp., 30 East 42nd St., New York 17, N. Y., has announced plans for a multimillion dollar expansion program at company's uranium processing facilities near here. Plans call for construction of a new mill for processing of uranium, in addition to two uranium ore receiving stations and chemical grading plants, one in Colorado and the other in Utah. Plants will be operated by the Union Carbide Nuclear Co., a division of Union Carbide & Carbon Corp.

Gainesville, Fla.—General Electric Co., Schenectady, N. Y., has announced plans for the construction of a new plant for the manufacture of communications equipment near here. Plant will be equipped with manufacturing and research facilities for the manufacture of two-way mobile radio, microwave, power line carrier and terminal communications equipment. Cost of new plant will represent an investment of $4 million.

St. Petersburg, Fla.—General Electric Co., Schenectady, New York, plans to construct a new plant for the manufacture of electronic equipment, for Sandia Corp., Albuquerque, N. M. Plant will have a floor area of 150,000 sq ft and will be ready for occupancy early in 1957.

Lafayette, Ind.—Eli Lilly & Co., 740 S. Alabama St., Indianapolis, Ind., pharmaceuticals, biologicals and antibiotics, has announced plans for a major addition to its Tippecanoe Laboratories, to cost an estimated $3.4 million on completion. Present plans include a three-story chemical manufacturing plant, service building, storage tank area and a waste treatment facility to be completed by December, 1957.

Terre Haute, Ind. — The American Brass Co., wholly owned subsidiary of Anaconda Copper Mining Co., recently held ground-breaking ceremonies for the construction of a new integrated aluminum mill. New plant is expected to be in production by September, 1957 and will represent an investment of $25 million.

Burlington, Iowa — General Electric Company's appliance control department, headquartered at Morrison, Ill., has announced plans for the construction of a new plant here. Site has been acquired for new facility which will have approximately 70,000 sq ft of floor space. Ground has been broken and plant is expected to be in limited production early in 1957. Cost of plant and equipment to approximate $1 million.

Lake Charles, La.—Petroleum Chemicals Co., Inc., jointly owned by the Continental Oil Co. and the Cities Service Co., has authorized plans for the construction of new plant for the production of ammonia. Work is to get under way at once for completion in the fall of 1957. Foster Wheeler Corp., 165 Broadway, New York, N. Y., has been awarded the contract for plant construction, reported to be approximately $12 million.

Leominster, Mass.—Foster-Grant Co., Inc., 289 N. Main St., plans to construct a new plant for the manufacture of nylon-type plastics. Construction of new plant will get under way soon for an initial capacity of about 2 million lb of material annually. Plant will be completed in 1957 at a cost of $1 million.

Fairfax, Minn.—International Minerals and Chemicals Corp., 20 N. Wacker Dr., Chicago, Ill., has plans under way for the construction of a new plant for the production of chemical plant food mixtures at local site here. Construction of new facility is to begin soon for completion in the spring of 1957.

Edison Township, N. J. — Aluminum Company of America, 1200 Alcoa Building, Pittsburgh 19, Pa., has announced the acquisition of a tract of land here on which it plans to build a new aluminum die casting plant. New 200,000 sq ft facility will eventually replace company facility at Garwood, N. J., 12 miles northeast of the Edison Township site. New plant will cost an estimated $1.5 million.

Livingston, N. J.—Chatham Electronics Division of the Gera Corp., has announced a major expansion program at company plant 630 W. Mt. Pleasant Ave., in this town. New building will be constructed adjacent to present plant and will be a one-story steel and brick structure of approximately 60,000 sq ft. Cost of addition will exceed $500,000.

Cleveland, Ohio—Lincoln Electric Co., 22777 St. Clair Ave., has authorized a major expansion program at local plant over a three year period, to increase plant capacity for the manufacture of welding machines and electrodes. Work is already under way and plant will be completed in early 1957. Lincoln also plans new plants in France, Australia, and a new addition to its Canadian facility. Total cost of expansion to exceed $8 million.

New Alexandria, Ohio — Vanadium Corporation of America, 430 Lexington Ave., New York, N. Y., has plans under consideration for the erection of a new plant for the manufacture of ferro-alloys, mainly ferrochrome, near here. The plant will be constructed on a 300-acre tract near the Ohio River and work will begin soon. Cost of the project reported to be in excess of $8 million.

Salem, Ohio—Eljer Division of the Murray Corp. of America, 7700 Russell St., Detroit, Mich., plans to construct a new plant with 130,000 sq ft of floor space for the manufacture of plumbing fixtures. Plant will represent an investment of $2.5 million. Swindell-Dressler Corp., Pittsburgh, Pa., are consulting engineers.

Toledo, Ohio—Owens-Corning Fiberglas Corp., 1833 National Bank Bldg., has announced a major expansion program of company facilities over a three year period. Plans for this year call for the rebuilding of the Newark, O., plant; new furnaces at Ashton, R. I. plant; additional textile facilities, more fabricating equipment and warehousing and improvements in processing equipment for all plants. Company proposes to expend in excess of $50 million on these developments.

Monroeville, Pa.—Koppers Company, Inc., Koppers Building, Pittsburgh, Pa., has plans maturing for the construction of a new multi-million dollar research center on a 176-acre site recently acquired for the purpose. Scope of company's research program will be more than tripled in the next 10 years.

Sweetwater, Texas—Flintkote Co., 4126 R.C.A. Building, New York 20, N. Y., manufacturers of building materials, corrugated boards and containers, adhesives and automotive industry products, plans to construct a new plant for the processing of gypsum. Construction of the new plant is scheduled to start in the fall and will be in production in late 1957. No estimate of plant cost has been announced.

Belle, W. Va.—E. I. du Pont de Nemours & Co., du Pont Building, Wilmington, Del., has authorized a major expansion program at local plant here and work is already under way. Plant will produce adipic acid via nitric acid oxidation.

In JENKINS *Monel-seated Bronze Gates*

THE WEDGE* TAKES THE WEAR - *and spares the rings*

Easy replacement of the wedge only — right on the line — restores full efficiency

THE MONEL SEAT RINGS are expanded into the body to assure a positive, leak-proof joint. Exhaustive tests in typical monel-seated gate valve services show that this permanent all-around support of the rings is essential to guard against deforming, loosening, or shifting.

***THE RENEWABLE WEDGE** (bronze or nickel alloy) has excellent wear resistance, but has a lower degree of hardness than the heat-treated Monel rings, which have optimum resistance to erosion and corrosion as well as abrasion. Thus, wear of the wedge leaves the rings relatively unaffected. When necessary to renew the wedge, you simply remove the valve bonnet, slip the old wedge off the stem, and slip on a new one.

GET PRACTICAL, LOW-COST RENEWABILITY in the valves you choose for the tough, punishing services that require Monel-seated gates. Compare . . . there is nothing simpler, faster, or more economical than Jenkins replaceable wedge design — and you also get the *plus* of Jenkins *extra value* in every other feature. Jenkins Bros., 100 Park Ave., New York 17, New York.

***MADE WITH BRONZE OR NICKEL ALLOY WEDGE**

The bronze wedge provides lasting economy for most applications. The nickel alloy wedge provides extra resistance where rapid wear and corrosion are factors.

JENKINS BRONZE GATES WITH MONEL SEAT RINGS

200 psi	300 psi
Fig. 270-U, Bronze Wedge	Fig. 280-U, Bronze Wedge
Fig. 270-UN, Nickel Alloy Wedge	Fig. 280-UN, Nickel Alloy Wedge
Fig. 270-UL, Bronze Wedge, U.L. approved for L.P.G. Services	350 psi Fig. 280-UX, Bronze Wedge

JENKINS BRONZE GATES INCLUDE 40 DIFFERENT PATTERNS

125 • 150 • 200 • 300 • 350 psi SOLID WEDGE • SPLIT WEDGE
SCREWED • FLANGED • SOLDER END • SOCKET END QUICK OPENING

Call your local Jenkins Valve Distributor for complete information.

JENKINS
LOOK FOR THE JENKINS DIAMOND
VALVES
SINCE 1864 TRADE JENKINS MARK
Jenkins Bros.

For more facts circle 567 on Reply Card

Failure of a unit heater normally indicates the beginning of accelerating maintenance expense and unpredictable heating performance. Experience shows that it is usually cheaper . . . and always wiser . . . to scrap obsolete units rather than attempt repair. Then, too, thousands of units built during the war have steel condensers because copper and aluminum were not available. If you still have any of these "war babies" in your plant, we suggest you check and replace them before another heating season begins.

NOW IS THE TIME TO

replace old unit heaters with new Modines!

Chances are you can benefit four or more ways!

You save because new Modines are extra dependable. You eliminate the probability of costly production shutdowns and lost man-hours due to heating system failure.

You save because new Modines are trouble-free, easy to inspect. There's no big overhead for maintenance or repair.

You save because new Modines are designed to provide economical fuel consumption and highly efficient heat distribution. You get more heat per fuel dollar, more comfortable working conditions for increased production.

You save because Modine offers you a liberal trade-in plan. It provides for exchange of old unit heaters for new Modines at a favorable cash allowance.

If you have severe corrosion, Modine helps you, too

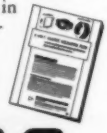
In some industries, severe corrosion requires frequent replacement of steam trap elements, return lines and unit heater condensers. You can minimize this problem when you install Modine HCR Unit Heaters.

HCR line of specially-built premium units is for use only where high corrosion resistance is needed. Retaining the light weight and superior performance of standard units, they also offer exceptional corrosion resistance. Ask your Modine representative to furnish complete details.

What's more, by standardizing on Modine Unit Heaters you can also simplify purchasing and installation . . . speed routine servicing . . . and enjoy widespread parts interchangeability.

For the complete story, see your Modine representative. He'll give you your copy of the new free booklet—"A UNIT HEATER EXCHANGE PLAN for the modernization and standardization of industrial heating systems." You'll find his name in your classified phone book. Or write Modine Manufacturing Company, 1563 DeKoven Avenue, Racine, Wisconsin.

SU-1330



Modine

UNIT HEATERS

In Canada; Sarco, Ltd., Toronto

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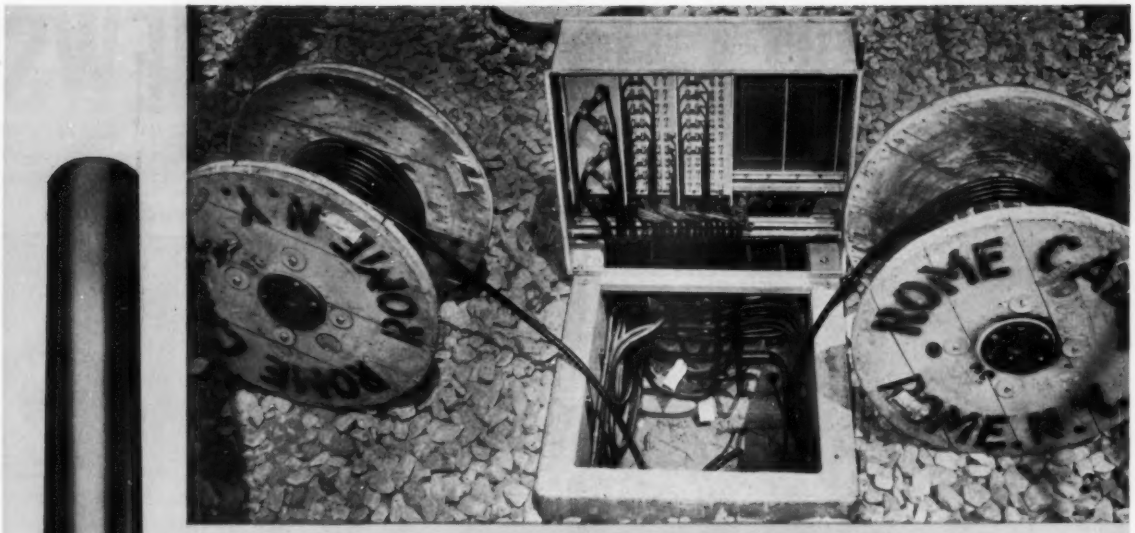

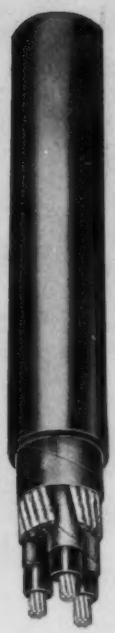

Install RoMarine-RoPrene underground in ducts—in panels, indoors or outdoors

Where you install cable in racks, trays or metal raceways, specify RoMarine-RoPrene. Its light weight and smaller diameters will make your job easier.

To light the Ft. Worth International Airport, 55 miles of CAA approved RoMarine-RoPrene single-conductor cable (rated at 3000 volts) was buried directly in earth.

One all-purpose cable for all these applications!

If you are one who has anything to do with the distribution of low-voltage power—underground, aerially, in ducts or in circuits combining all three—this is for you!

RoMarine-RoPrene is an all-purpose nonmetallic sheath power cable you can use for a variety of industrial power distribution jobs.

This product of Rome research and engineering has proved its superiority in so many ways you can bank on it without reservation.

RoMarine is a high-quality heat and moisture-resistant insulation (RH-RW) exhibiting exceptional electrical stability after long-time immersion in water together with excellent long-life aging characteristics. RoMarine conforms to all requirements of ASTM Specifications D754-54T, plus additional moisture absorption tests as specified by Underwriters and IPCEA Appendix N.

RoPrene is a tough, impervious Neoprene sheath fitting tightly to the insulation and possessing a high degree of resistance to oxidation, heat, flame, weather, oil and most chemicals. RoPrene conforms in all respects to ASTM Specification D752 and Grade I of IPCEA Appendix K.

RoMarine-RoPrene is available in two distinct types with respect to application and operation, namely, Style RR and Style RR-D.

RoMarine-RoPrene approvals

RoMarine-RoPrene, Style RR.

This is Rome Cable's standard product, manufactured with sheath thicknesses suitable for *direct earth burial*, and is equally suitable for use in conduit or duct, as well as aerial installation where greater protection against cable rings or binding wires is desired. It is Underwriters' approved as Type USE for underground service entrances and is so labelled and surface marked.

RoMarine-RoPrene, Style RR-D.

This type construction is offered for use in ducts or underground conduits as an economical power cable manufactured with the same high-quality insulation, but with lighter sheath thicknesses. While approved by Underwriters' Laboratories Inc. and identified as Type RW (60°C.)—Type RH (75° C.), this construction *is not recommended for direct earth burial.*

CAA Specification L-824

RoMarine-RoPrene, Style RR is approved by the Civil Aeronautics Administration for airport wiring when CAA Specification L-824, with Type A insulation applies.

For more detailed specifications, write for Bulletin RR-2.

It Costs Less to Buy the Best

ROME CABLE Corporation
ROME · NEW YORK
and
TORRANCE · CALIFORNIA

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MATERIALS-HANDLING NEWS

★ Panel Discussions by Bassick, World's Largest Manufacturer of Casters and Floor Protection Equipment ★

Bassick on tough Carrier Corp. job

Longer wear from Bassicks

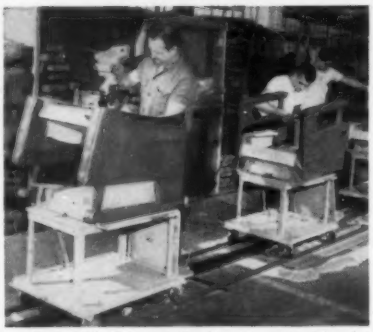
Policing a 1.5 million square foot production area at Carrier's huge Thompson Road plant near Syracuse, N. Y., means removing 50 tons of refuse a day.

Mobilizing a fleet of 250 trash trailers requires casters that can take punishment. They have to carry quarter-ton loads without damage to asphalt paving. They've got to stand up when pulled over railroad sidings, (above) door sills and unpaved areas at tractor speeds of 10 to 12 mph. Carrier reports that the new Bassick Floating Hubs are especially durable and have proven their ability to handle rugged assignments. Providing long wear and low maintenance, the Bassick casters also eliminate damage to floor areas.

Floating-Hubs pass destruction test

Before accepting Bassicks, Carrier tested them on two all-metal 3000 lb. payload sledges. Conventional casters had lasted one day at this job. The test Bassick Floating-Hubs are still in use today after more than ten months. Confident and satisfied with Bassick dependability, Carrier maintenance men actually weld the casters (above) to the trash trailers.

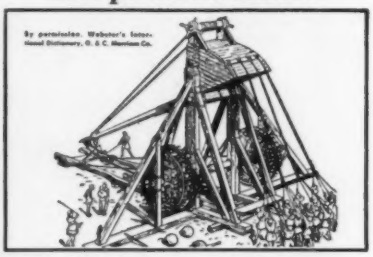
Bassick assembly line for BarcaLonian chairs



Assembly line production—unusual in the manufacture of upholstered furniture—is the big news at Barcalo Manufacturing Company's new Buffalo plant. At capacity, 200 BarcaLonian chairs a day will be rolling through the new production line—on Bassick grooved-wheel casters over inverted angle-iron tracks. Perhaps you could use Bassick grooved-wheel casters to set up efficient, economical assembly line production in your field?

Explosion Proof Surgical Light made by Wilmot Castle Company, Rochester, N.Y., uses Bassick Casters for mobility. The Bassick conductive wheels ground static charges, eliminate danger of sparks near explosive anaesthetics.

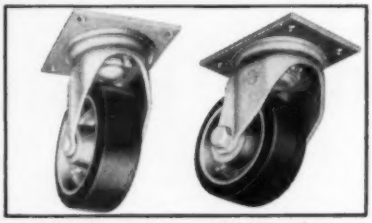
Man-powered casters



The Ballista, an ancient form of cannon, used to fire giant arrows against walled towns, was sometimes propelled by caging a man inside each wheel. Today, Bassick casters can be one of the big guns in your attack against high materials-handling costs. Talk to your industrial distributor about Bassick casters. He can help you . . .

Cut costs two ways

He'll keep you up to date on new efficient materials-handling methods—like Barcalo's assembly line to the left. He'll bring new cost-saving products to your attention—like Bassick's S99 and H99 sealed casters shown below.



H99 Medium Heavy duty sealed casters

S99 Heavy duty sealed casters

No lubrication problems

You can eliminate slick floor hazards, and put lubrication maintenance on a once-a-year basis with Bassick's sealed construction. A baffle ring keeps dirt out and retainer cup keeps grease in swivel bearing. Wheel bearing seal excludes foreign matter, seals in grease. Alemite fittings allow you to flush out old, ineffective lubricant.

See our catalog in Sweet's or write for copy

THE BASSICK COMPANY
Bridgeport 2, Conn.
In Canada: Belleville, Ont.

Bassick
A DIVISION OF
STEWART SW WARNER

MAKING MORE KINDS OF CASTERS...MAKING CASTERS DO MORE

For more facts circle 570 on Reply Card

Parlon® Stays On

Meets Challenge of Chemicals

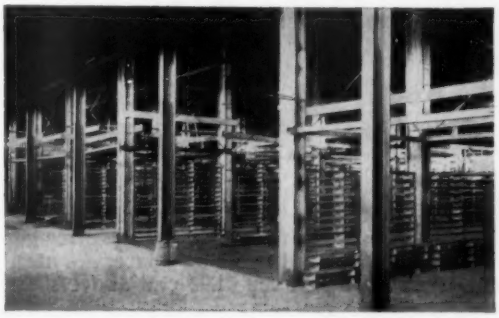
IN A VINEGAR PLANT—To protect a new vinegar-manufacturing building against the corrosive fumes of acetic acid, the interior of this plant was finished with Parlon-based Rigortex, a product of Inertol Co., Inc., Newark, N. J.

No matter how strong the corrosive challenge—whether it comes from acid, alkali or the elements—Parlon-based protective coatings are providing longer protection at lower long-term cost.

Easy to apply and quick drying, Parlon-based chlorinated rubber paints have proven themselves in actual use where other finishes have failed to provide satisfactory service. That's why—for those hard-to-protect surfaces—more and more maintenance people are turning to Parlon finishes to solve their protective coating problems.

No matter how difficult your maintenance paint requirements, chances are there's a Parlon-based coating that will meet them. For full technical data on Parlon, call or write your regular supplier of quality paint finishes or write directly to Hercules.

. . . AND A FERTILIZER BUILDING—The steel structures of this fertilizer mixing building are continually under attack from ammonia gas, nitric acid fumes, compounds containing free sulphuric acid and free phosphoric acid. To meet this challenge, Parlon-based Torex, another Inertol Co. product, was selected.



Cellulose Products Department
HERCULES POWDER COMPANY
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CR56-4

PARLON (CHLORINATED RUBBER) PAINTS ARE AVAILABLE FROM 400 MANUFACTURERS UNDER THEIR OWN BRAND NAMES

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When you buy Morton Purex Salt, you get high purity evaporated salt that is made in a controlled-particle size to prevent packing and channeling. None of your freight bill or purchase price goes toward paying for shale and sulphates . . . insolubles like those shown on the filter pad above. (And the cost can be considerable. In every 100 lbs. of any type of rock salt, you are paying for up to 5 lbs. of insolubles.)

With Purex, no time or labor is spent in cleaning out insoluble matter from your brine making system to keep it functioning at peak capacity. For Purex is 100% soluble. Morton Purex will leave no accumulation of material in either brine or water softener tanks. It can be used in bulk wet-storage systems, and in the Morton Model-E Brinemaker.

For more information about Morton Purex Salt, or for free, expert help on any water-softening or brine-making problem, write or wire:

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INDUSTRIAL DIVISION
Dept. PLE-8, 120 So. La Salle Street.
Chicago 3, Illinois

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PRESENTING...

the NEW LINK-BELT MOTOGEAR

for bracket-mounting NEMA motors

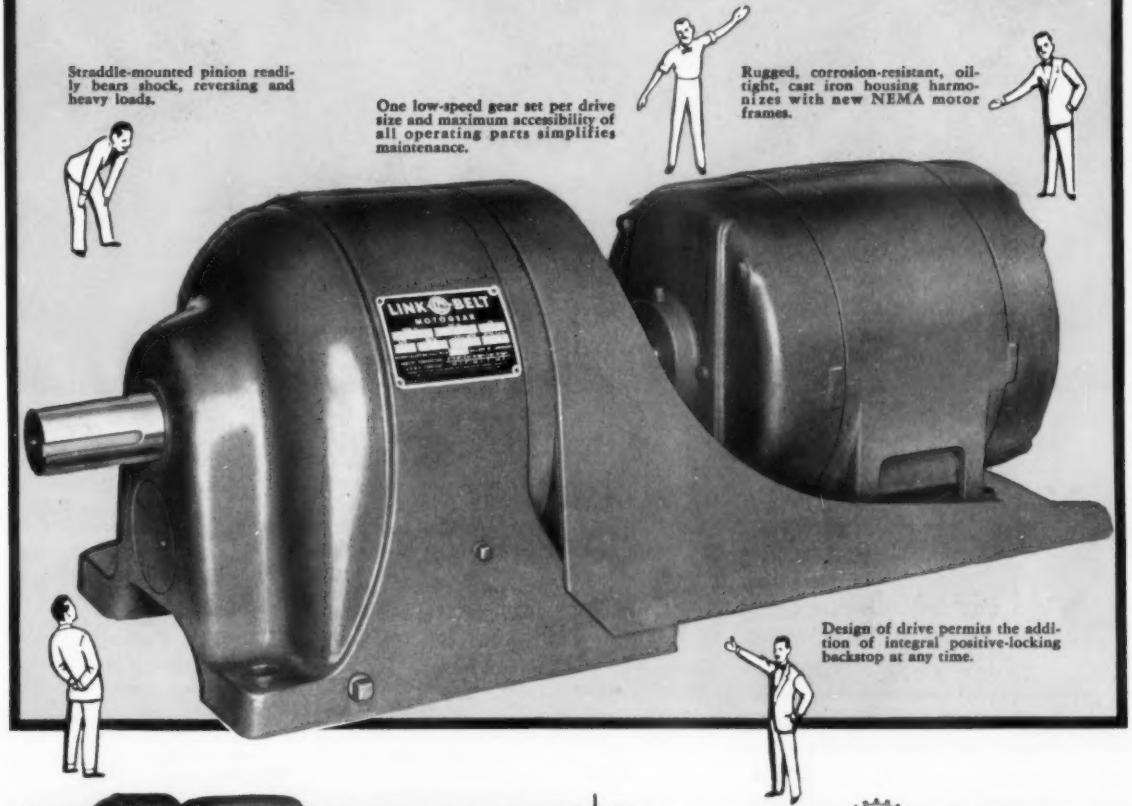
If drives in your plant operate continuously, the dependability of Link-Belt Motogears provides a sure means of minimizing costly, production-crippling downtime. Replacing a motor is simple and easy: just remove four bolts and separate the coupling—no need to drain oil. And design of the bracket assures rapid motor realignment. Sizes up to 60 hp; ratios from 6.2:1 to 292:1.

These are just a few of many advances in design you'll find detailed in 28-page Book 2447. Get a copy now from your nearest Link-Belt office or authorized distributor of Link-Belt products.

Straddle-mounted pinion readily bears shock, reversing and heavy loads.

One low-speed gear set per drive size and maximum accessibility of all operating parts simplifies maintenance.

Rugged, corrosion-resistant, oil-tight, cast iron housing harmonizes with new NEMA motor frames.



Design of drive permits the addition of integral positive-locking backstop at any time.

The new, improved Link-Belt line also includes compact Gearmotors with flange-mounted NEMA motors combining flexibility with outstanding design innovations.

LINK-BELT

ENCLOSED DRIVES

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 13,899

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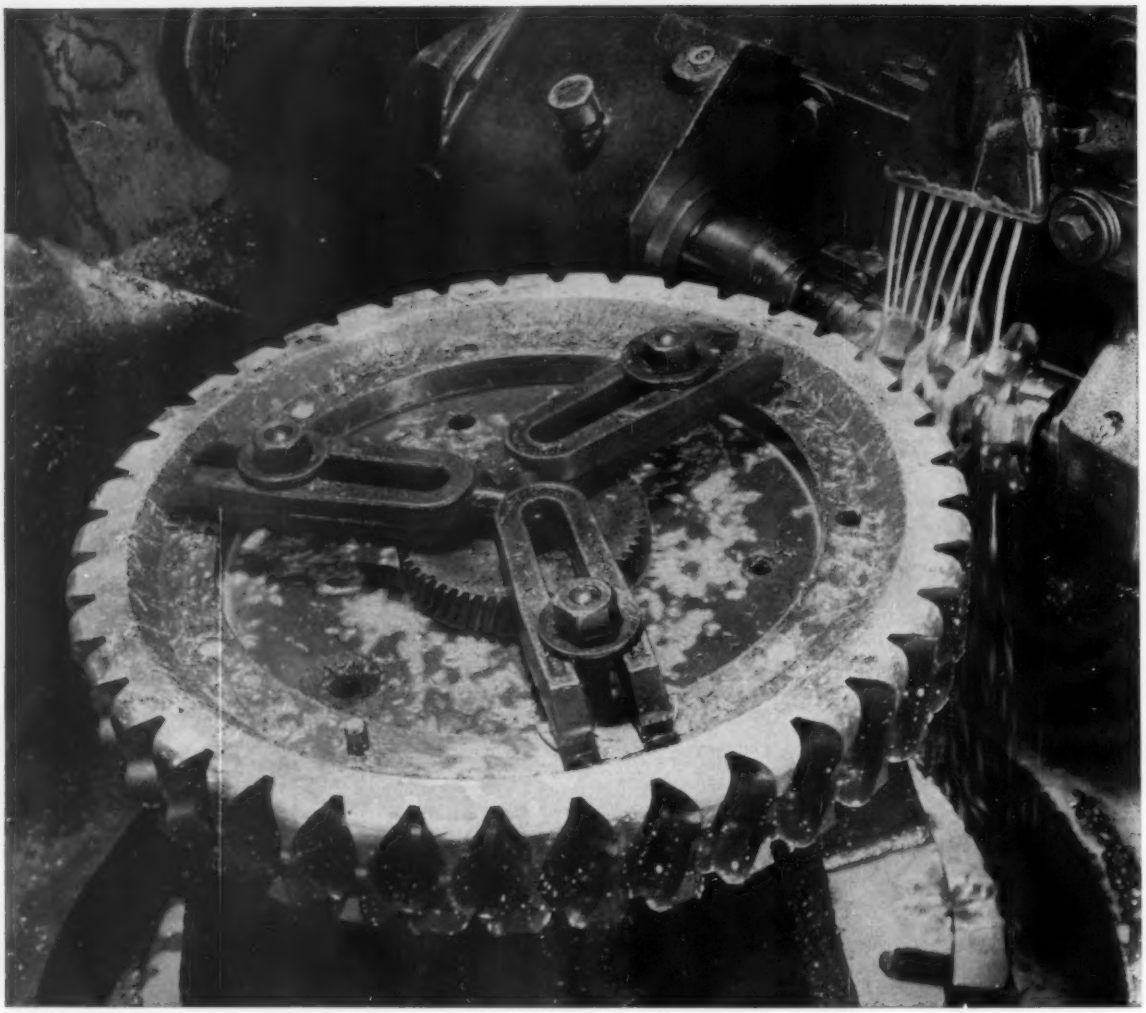

You can't do a quality job ...unless your coolant is clean

Abrasive dust in a machine tool's coolant seriously interferes with quality work and puts added wear on the coolant pump. Dirty coolants are particularly harmful in precision work. The only sure protection is effective filtration. It's also far more economical than repeatedly cleaning your equipment, and replacing the coolant. The finest filter available for this job is the Purolator Micronic® filter. Purolator's Micronic filters assure full protection for all kinds of work – and pumps – as no other filter does.

Purolator's Micronic element is made of plastic-impregnated cellulose. Its controlled porosity evenly filters out fine submicronic dust particles. It can't possibly channel, and it's in no way affected by high temperature, oil, or water.

Find out how Purolator Micronic filters can help you improve precision and cut down wear and tear on equipment by keeping coolants clean. Write for new Industrial Catalog to Purolator Products Inc., 970 Brunswick Ave., Rahway, N. J. Dept. P3-84.

PUROLATOR

"FIRST IN THE FIELD OF FILTERING"

PUROLATOR PRODUCTS INC., Rahway, New Jersey, and Toronto, Ontario, Canada

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The flat-topped, evenly spaced risers on the Multigrip Floor Plate afford perfect traction for fork truck wheels on this 20° slope, even when the plates are wet. Traction like this does much to eliminate slipping accidents.

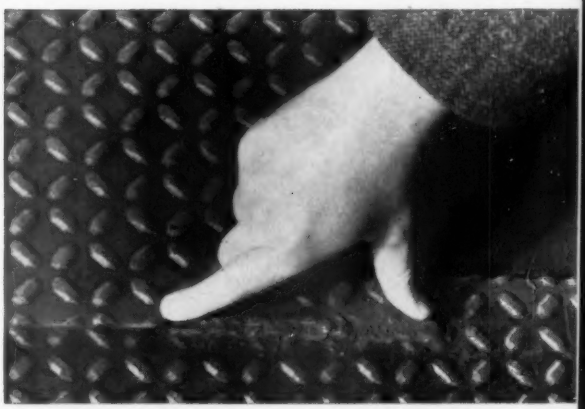
All aisles and ramps in this 36-dock Chicago warehouse of Trans American Freight Lines are protected with USS Multigrip Floor Plate. 24 hours a day—every day—heavy vehicles roll back and forth over this tough steel floor plate without damaging it.

HOW MULTIGRIP FLOOR PLATE STANDS UP UNDER 24-HOUR-A-DAY PUNISHMENT

...on Trans American Freight Lines loading docks

USS Multigrip Floor Plate's flat-topped risers give perfect traction to feet and wheels. These tough steel plates take a beating without chipping, cracking, or splintering. Multigrip Floor Plate is easy to clean with a hose or broom and drains freely in all directions. Multigrip may also be bent, formed and welded where necessary and is available in large plates, cutting installation waste. You'll find it pays to specify long-lasting Multigrip Floor Plate for use on ramps, aisles, platforms, stairs, floor areas, or wherever safety or maintenance is a prime consideration.

UNITED STATES STEEL CORPORATION, PITTSBURGH
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, CHICAGO
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



Heavily laden fork lifts have rolled over this weld many thousands of times. Despite the extreme stress, the weld is still perfect and strong.

USS multigrip

FLOOR PLATE

Sold by leading distributors from coast to coast

UNITED STATES STEEL

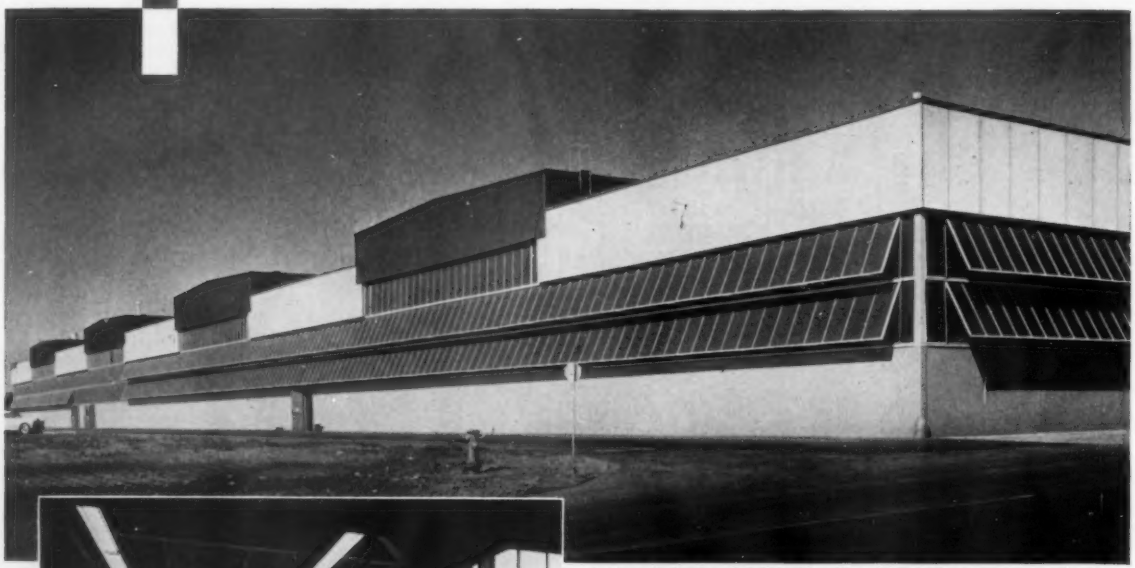
LIGHT and AIR without HEAT and GLARE

Coolite Installed in Top Hinged Windows Floods Factory with Conditioned Daylight

Excellent ventilation and plentiful, eye-easy, natural illumination promote employee efficiency and morale in this United States Electric Motor Plant, Anaheim, California. The hinged windows are glazed with Coolite, Heat Absorbing, Glare Reducing Glass to provide the finest, low-cost daylighting.

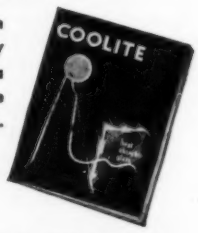
Coolite diffuses better light deep into interiors, eliminates contrasts that cause costly visual errors. Coolite absorbs up to 50% of unwanted solar heat rays, helps keep work areas cooler. Employees see better, feel better, work better, under "Cooliting."

This outstanding plant also uses diffusing Wire Glass for excellent daylighting plus protection against breakage and fire in vulnerable areas. Installed in doors, windows, skylights, Mississippi Wire Glass (Approved Fire Retardant No. 32) helps to bottle up small fires . . . keep them from roaring into costly conflagrations.



Architects: Smith, Powell & Morgridge. Three Mississippi patterns were employed in this plant: Coolite, Heat Absorbing, Glare Reducing Glass, 19,212 sq. ft.; Smooth Rough, 5,256 square feet; Coolite Wire, Glare Reduced, 5,377 sq. ft.

Let Coolite brighten your production picture with better daylighting. Specify glass by Mississippi. Available in a wide range of patterns and surface finishes through leading distributors.



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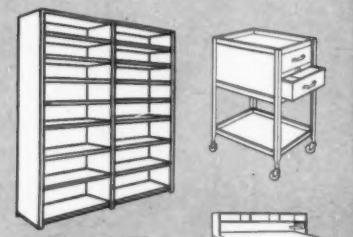

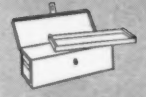

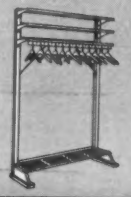

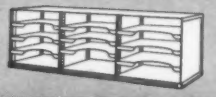

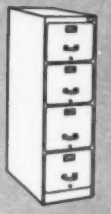

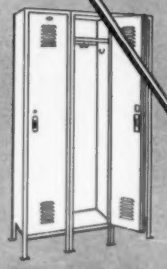

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- Flat Drawer Files
- Revolving Bins
- Filing Cabinets
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- Coat Racks
- Work Benches
- Bench Drawers
- Service Carts
- Sorting Files
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- Shop Desks

LYON METAL PRODUCTS, INC.

General Offices: 891 Monroe Ave., Aurora, Ill.
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Dealers and Branches in All Principal Cities

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NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 187-188.

1—FLOOR WAX gives bright finish without buffing

Improved Super Westwax contains Mirite, a synthetic resin designed to give the wax its hard, tough, mirror-like finish, and Ludox, to provide even greater slip resistance than it previously exhibited. Company states that prime No. 1 Carnauba wax is used in the manufacture of this material and it is this ingredient which gives the characteristic light color, enabling use on light-colored surfaces and even white floors without discoloration. Super Westwax is claimed to dry within 20 min, can be applied with mop or lamb's wool applicator. Initial coats cover 1500-2000 sq ft per gallon. While buffing is unnecessary to produce a bright finish, surfaces may be lightly buffed to remove scratches and mars, it is noted, and may be damp-mopped without spotting. West Disinfecting Co.

2—ELECTRIC HAMMER is lightweight, powerful

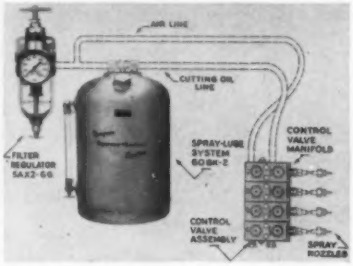
Weighing only 12 lb, 13 oz, the H54U Electric Power Hammer has advantages, which, according to manufacturer, make it efficient, easy to use, and low in maintenance costs. Solid, hard-hitting blows are assured by a "spring-floated" piston, with the sealed spring accelerating the piston to produce a more powerful blow, it is announced, and this design prevents leak-

age and loss of power. For quiet operation, the tool has hardened helical gears and a counter-balanced crank assembly. Other features are a Neoprene-mounted nozzle which protects the hammer when accidentally run without a tool, and a heavy-duty switch.

The tool is available in a standard kit, with choice of three packaged accessory kits, or individual accessories may be purchased. The standard kit includes the hammer with 15-ft cable and grounding adapter, together with a metal carrying case, can of oil, tool retainer, dust shield, drill adapter (with handle and sleeve) drift and ⅝-in. diam steel star drill. Details in Form 5199. Ingersoll-Rand Co.

3—SPRAY SYSTEM puts cutting oil where needed

This Spray-Lube System is designed to apply a more uniform and higher quality spray of cutting oil directly upon the close interfaces between the tool and work piece. It can be directed from the underside of the curled chip, or from any other angle that will best reach the



critical lubrication points, says manufacturer. The spray of coolant exposes a large fluid surface area and thus absorbs more heat—faster. With this system, flow of air and cutting oil is said to be more accurately controlled. The oil spray is produced within the nozzle itself, by means of a tube within a tube, it is explained, and the spray is delivered to the cutting area the instant the machine is turned on. Control valves are designed so that they can be closely mounted in manifold for multi-point application.

The unit is described as compact and convenient to install. A single filter-regulator unit filters air and regulates pressure of both air and liquid. The liquid filter is inside the reservoir. An average size unit occupies a space only 14 by 20 by 7 in. with a 2-gal liquid reservoir. C. A. Norgren Co.

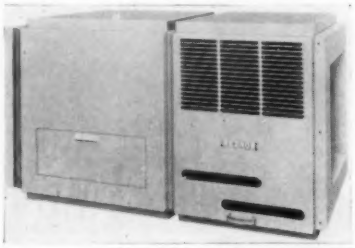
4—HYDRAULIC FLUID is fire resistant snuffer type

Irus Fluid 902 is announced as an economical "snuffer" type hydraulic fluid with fire-resistant qualities that prevent its burning on contact with flames, heated metal surfaces or molten metal. A formulation of water, petroleum, hydraulic oil and emulsifying agents, the fluid eliminates possibility of combustion by releasing its water content as a protective steam blanket to quench fire, manufacturer explains. This "snuffer" action reduces local temperatures and displaces oxygen from the immediate area—it is noted that in most cases the remainder of the hydraulic fluid will not support its own combustion. Another advantage cited is that the oil will continue hydraulic action should the water be dissipated.

Despite the water in its composition, the fluid is said to possess all petroleum oil characteristics vital to proper functioning of hydraulically-operated machinery. It is reported non-corrosive on ferrous and most non-ferrous metals; compatible with normal system components; as having film strength and high shear rate viscosities. It is colored bright yellow to permit instant recognition and location of possible leaks. According to company technicians, Irus Fluid 902 can replace any conventional mineral or synthetic oil hydraulic system, and can be installed without modification of lines, pumps, valves or cylinders. Preparation of existing systems before installing the fluid requires only cleaning to remove previous materials. Also, the fluid is said to have no effect on packing materials, seals or hoses, and to be suitable for use in most industrial vane and gear pumps. Irus Fluid 902 is reported to cost up to one-third less than synthetic oils. Shell Oil Co.

5—GAS-FIRED FURNACES, enclosed, horizontal units

Greater ease of installation, improved appearance and a new size are features of a redesigned line of PAC Gas-Fired Horizontal Furnaces. Several factors contribute to installation versatility. Interchangeable panels on the blower compartment make it as easy to bring return



air duct in at the top, bottom or either side as at the conventional end opening. Because air-flow through the heater may be in either direction, it can be installed with the access door to controls and burners on the most convenient side. Although shipped assembled for the direction of air flow specified, the unit can be readily converted in the field for air flow in the opposite direction.

The furnace is completely enclosed and the design has a streamlined appearance which blends with the duct work in which it will be installed. Side panels are 20-in. high, the same height as the connecting ducts. Filters and filter racks are optional equipment. Four sizes are

This Crane valve on superheated steam since 1946—with no maintenance

You'll spot cost-saving performance in the record behind this Crane valve—it has been on duty an even decade of years, with no maintenance at all!

Neches Butane Products Company installed this Crane 8-inch, 900-pound Pressure-Seal angle stop-check valve in 1946 in its butadiene plant in Texas. On superheated steam boiler service, this valve has never failed to close tightly and surely—and operate smoothly and easily—with no sticking, no troubles—no need to go near it with a wrench.

There's no question that dependability is a must in service like this. Minimum restriction of steam flow—plus smooth, positive and quick seating on backflow—*must* be provided for safe, steady boiler operation. And Crane stop-check valves can do it—*have* been doing it for years and years.

Before you specify any valve, be sure to look into the advanced designs and materials, the broad selectivity and service suitability of the great Crane line. You'll find everything you need in valves and fittings—built to the highest standards of quality. Get full information from your local Crane Representative, or write to address below.

CRANE VALVES & FITTINGS

PIPE • KITCHENS • PLUMBING • HEATING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

For more facts circle 578 on Reply Card

NEW PRODUCTS

(Begins on page 136)

available: 125,000, 100,000 and 75,000 Btu, as in the former line and a new 50,000-Btu size. Reznor Mfg. Co.

6—FLUORESCENT LAMP gives much more light

Termed the VHO (very high output) this standard shaped fluorescent lamp is claimed to provide two and one-half times as much light as conventional models. First two models in the line include a 100-w 4-ft lamp rated at 6200 lumens, and a 200-w, 8-ft lamp of 13,250 lumens. According to manufacturer, the VHO has four outstanding features: more efficient lamp diameter; rapid start continuous filament heating; "pressure control" center; and use of neon gas instead of argon. It is explained that the best mercury vapor pressure and temperature conditions for highest efficiency are narrow in limits, and that the "pressure control" center built into the lamp structure makes these possible—and that with these conditions, neon is superior to argon and aids in the light output.

The new lamps use the same type of recessed double contact base as the high output rapid start lamp family, it is announced. Push-pull lampholder design permits the same "back-to-back" spacing for both HO and VHO types. Broad in application possibilities, the new lamps are suggested for high bay plant lighting, as well as medium and low bay use. Outdoor uses include parking lots and storage areas. Because of its very high output, the VHO is reported both a dollar saver and a space saver. Where conditions require four conventional lamps, for example, only two VHO Lamps would be needed, says manufacturer, and the fixture can be of conventional size. Sylvania Electric Products Inc.

8—PACKAGE DISPENSER for automatic welding wire

Payoffpaks are lightweight and durable and protect wire against coil distortion or wire corrosion, it is announced. Also, they are described as compact, easily opened and resealed. The dispenser offers the advantage of continuous welding up to 500 lb of deposited weld metal, it is noted, and the wire feeds steadily. A full range of welding wire in sizes from ⅛ in. to 0.030 in. is available in this package dispenser, including a complete list of analyses from Armco Pure Iron up to 1.10 carbon steel and the low alloy types. Wires are usually copper coated, but can be furnished bare or lightly oiled. Page Steel & Wire Div., American Chain & Cable Co., Inc.

9—SAW is multi-purpose, eight-position type

This multi-purpose eight-position saw features a quick acting unbreakable chuck which has no loose parts, manufacturer announces. The saw is claimed easy to set—a few turns on the copper locking nut let the blade rotate and lock in any of the eight positions. The saw has a pistol grip handle and chrome and copper finish. It also has three interchangeable blades; a metal cutting keyhole blade, a metal cutting stub blade, and a vanadium steel wood cutting blade. Allway Mfg. Co.

7—PLASTIC PILLOWS slow up evaporation in tanks

Designed to retard evaporation of liquids in open tanks and vessels up to 70 per cent—and thus increase the service life of these solutions—these polyethylene pillows are, in effect, small floating tank covers. They are offered for use in conjunction with nickel and chrome solutions, solvents at room temperatures, reagents and water. Manufacturer says that a 1½-in. thick layer of the pillows is sufficient, regardless of the solution. The pillows are ⅝-in. OD by 1¼ by ¼ in., with a wall thickness of 0.015. Both ends are sealed after air has been introduced for added buoyancy. When a loaded basket is lowered into a solution, the pillows give way allowing easy access; when the basket is removed, the pillows float back into position to provide surface coverage. American Agile Corp.

10—JET GUN cleans condenser tubes out fast

This super-jet condenser cleaning tool utilizes a gun-and-slug method to remove slime and scale and is reported to provide extremely fast cleaning. With it, one man can quickly load an entire bank with cleaning slugs and shoot them through in rapid succession, it is pointed out. The gun is described as a rugged duty tool weighing only 2¾ lb. It can be operated by air or water pressure and the effective pressures range from 50 to 200 psi.

Three types of cleaning slugs in sizes to fit all standard tubes can be furnished, to handle cleaning under practically all

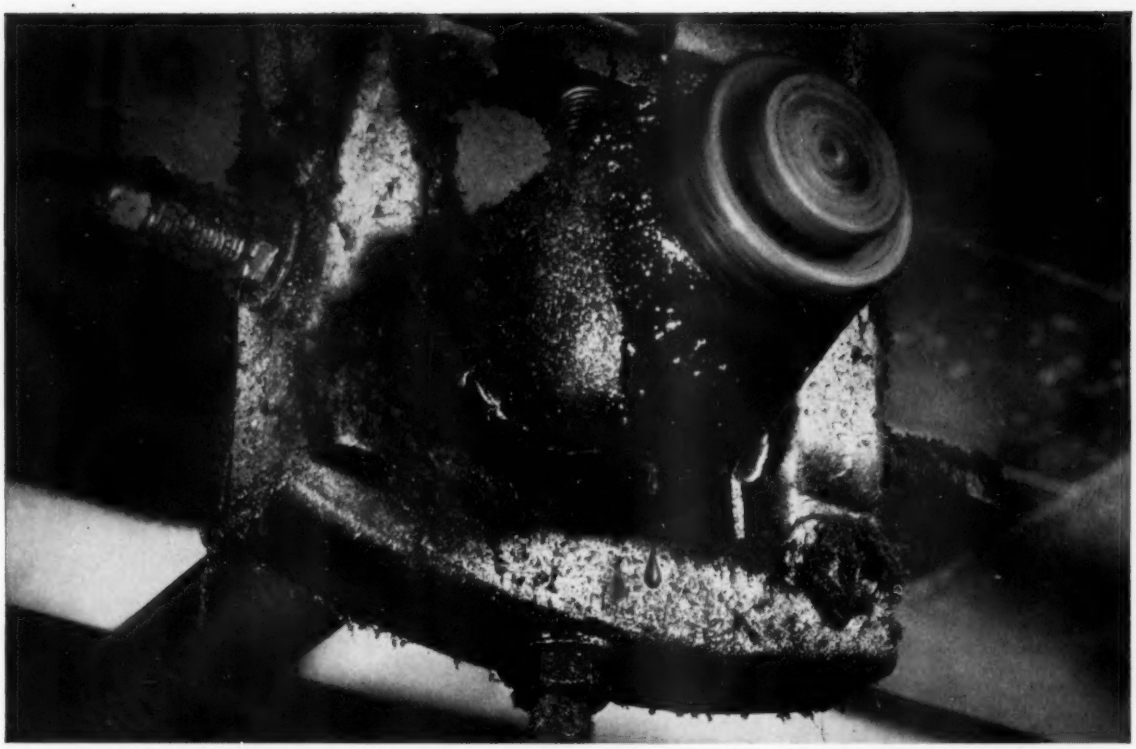
conditions. Spool-type slugs, for normal slime removal, have a cup at the forward end which expands to wipe the inside of the tube. Bullet-shaped slugs are for removing thick slime deposits. Scraper-type slugs serve to cut away scale or mineral deposits as they are driven through the tube. The latter two types have "jet action" holes in the side wall to admit water or air for flushing away deposits as they are removed. Crane Packing Co.

11—TEMPERATURE CONTROL for hot spray heaters

Any temperature in a 90 to 170 F range can be dialed externally with the Viscomatic, it is announced. This controller is introduced for use with manufacturer's hot spray heaters. A sensing element reads fluid temperature and controls within ± 2 deg. Company notes that introduction of new finishing materials with varying temperature level requirements has increased the need for easy temperature adjustment on hot spray equipment. Variation from 150 to 170 F produces little viscosity change, it is explained, but at levels below 150 F, temperature changes cause marked differences in viscosity. The Viscomatic is designed for control at any level, and is reported particularly advantageous on furniture lacquers, wrinkle finishes and heat sensitive varnishes. The controller is announced explosion proof, and is factory installed with the heater. A booklet, "Why Hot Spray", gives details. Spee-Flo Co.

12—RUST REMOVER strips paint and primer, too

An alkaline material, this powdered compound is said to remove rust, paint and primer in one dip and rinse operation. Manufacturer says that it removes light rust in less than a minute, and heavy



IT'S EASY to reduce annoying and expensive oil leakage like that shown here. The simple act of switching to a Suntac oil – *without making any other changes* – can cut leakage an average of 35%...sometimes 90%!

SUNTAC STOPS SHUTDOWN CAUSED BY OIL LEAKAGE

A manufacturer was having trouble with oil leakage and throw-off from bearings of overhead shafting. This resulted in hazardous conditions and low employee morale. Production had to be shut down frequently. Oil costs were high.

A switch to a Suntac® lubricating oil solved these problems.

If you're losing oil through excessive leakage from rotating or sliding parts, a Suntac oil can cut your consumption an average of 35%. These oils are especially compounded to reduce drip, throw-off, squeeze-out; their greater adhesiveness enables them to cling firmly to the parts...as they lubricate.

Suntac oils can reduce consumption up to 90% when used in hydraulic systems, circulating systems, and in other continuous use applications.

For further information on versatile Suntac oils, see your Sun representative or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. PY-8.

SUNOCO®

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY Philadelphia 3, Pa.

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IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL

For more facts circle 579 on Reply Card

NEW PRODUCTS

(Begins on page 136)

rust and multiple paint layers in only a few minutes' immersion. Even red oxide primer, baked lacquer, acid-proof paint and asphalt finishes are claimed to yield quickly. According to company, this compound contains no cyanide compounds, requires no electrolytic equipment, and emits no corrosive fumes. It doesn't affect dimensional tolerances or cause hydrogen embrittlement, it is noted, and needs no neutralization—just a pressure rinse. Metals de-rusted with it are claimed no more subject to rusting than is new metal. Turco Products, Inc.

13—UNIT HEATERS available in 34 models

This newly-designed line of Little Giant Unit Heaters, of the down-blow or horizontal-blow type, includes 34 models in capacities from 34,000 to 684,000 Btu (steam ratings) per hour. These heaters

are draw-through type and utilize rectangular wrap-around heating elements. The elements are designed to operate with either steam or hot water, and are constructed of copper tubing with extended corrugated-aluminum plate-type fins. Male pipe connections extend from square steel headers on opposite sides of the down-blow unit, permitting installation close to the ceiling and providing maximum headroom. The motor can be removed through the fan outlet from below, without disturbing the installation. Bulletin B-1730 gives data on these heaters. Warren Webster & Co.

14—FLOOR TOPPING resists corrosion, hardens fast

Chem-Top is intended for food and chemical processing plants, breweries, and others having severe floor corrosion problems. Composed of chemically inert aggregate and a catalyst-hardened inorganic plastic binder, Chem-Top makes a smooth mortar to be troweled over new or old concrete, brick, quarry-tile, metal or wood at a thickness of ⅛ in. or less, it is announced. It hardens quickly, says manufacturer, giving a dense, hard-wearing surface that withstands traffic impact, is easy to clean and non-reactive to even high-concentrate reagents.

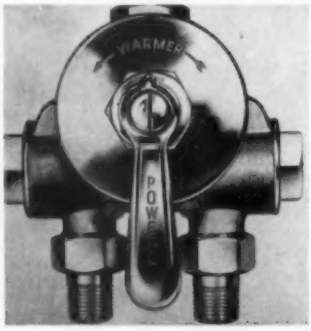
Tests of Chem-Top are reported to show no decomposition by concentrated hydrochloric, nitric and acetic acids. Also, according to manufacturer, test installations have shown no trace of breakdown under corrosive action by fatty acids, brine, animal and vegetable oils, sugar syrups, sour milk, and strong cleaning caustics. A Chem-Top floor is smooth yet slip resistant, it is claimed, and resilient, although four times tougher than high compression concrete. Liquids can be cleaned off by a squeegee. Chem-Top comes in red, gray, green and cement color. The Garland Co.

15—X-RAY FILM is sensitive, and fast acting

Type AA Industrial X-ray Film retains sensitivity of company's Type A, but is announced as having greatly reduced exposure needs. It offers the industrial radiographer new versatility in working with all types of X-ray machines and gamma ray sources. Film speed is said to range up to twice that of the Type A Film. Advantages thus offered, are reported to include: reduced exposure time; increased radiographic sensitivity through higher densities with established exposure and processing techniques; greater subject contrast, more detail and easier readability; shortened processing cycle; reduced possibility of pressure desensitization under conditions of use. Eastman Kodak Co.

16—MIXING VALVE produces hot water from steam

Cold water and steam can be automatically mixed in the Style D Mixer to provide hot water at any desired temperature, it is announced. The control can be used to obtain hot water where only cold water and steam are available, or to superheat plant hot water for a processing application. The mixer takes steam and cold water at pressures from



10 to 100 lb. Turning the handle regulates temperature of discharged hot water at any point from that of the incoming water to 200 F, says company, regardless of pressure changes in supply lines.

A pressure equalizing valve, consisting of a floating piston, controls and equalizes the pressure of steam and water before they enter the mixing chamber. Check valves in each inlet serve to prevent interchange of steam and cold water when mixer is not in use. The temperature adjustment handle also operates an internal shut-off valve. The mixer comes in ½-in. size, priced around $65, and a ¾-in. size, $130. Details are in Bulletin 369. The Powers Regulator Co.

17—PHOTO-ELECTRIC UNIT plugs in like a light

The PE-150 is described as a reliable and inexpensive control device that can be set up by anyone. The light source unit directs the beam into the photoelectric tube. Any object can be made to cut off the light beam, says manufacturer—even freshly painted parts, or those so delicate that mechanical fingers can't be used. Properly placed controls can serve to separate objects according to height. Reflected light may be used to identify light and dark objects. The contacts control 10 amp at 110 v, a-c, 60 cycle, enough current to operate counters, magnetic relays, solenoids and other magnetic devices. Units are housed in gray steel cases. Bulletin PE-150 gives data. The Passante Co.

18—COATED TAPE for underground pipe fittings

Intended for field wrapping of joints and fittings on underground pipe lines this coated tape is said to be comparable to the coating used in the overall wrapping operation. Manufacturer of this tape previously offered a product (called Duratape), which is a glass fiber mat coated on both surfaces with coal tar. The new product coating is asphalt. Thus, company can provide either coating to conform to that applied on the main body of the pipe. L.O.F. Glass Fibers Co.

19—CLEANING ROD swabs liquid level gages

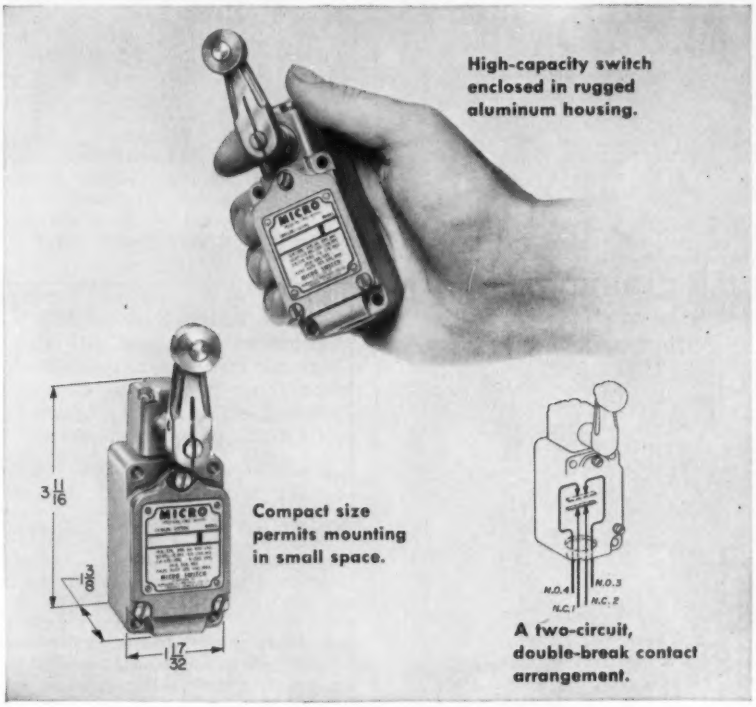
To use this cleaning rod you slip a tubular cloth swab over a piece of corrosion-resistant spring steel on the end of the rod, apply a detergent or other cleaning medium to the swab and insert the rod into the end connection of the gage or the drain in the offset of a valve. When the swab is visible in the glass, you simply pull back the handle and tighten the thumb screw. The result is an increased arc of the spring which forces the swab against the glass—permitting a good cleaning job with little effort. Rods come in a standard length of 36 in., cost less than $32.00. Longer ones may be had. Jerguson Gage & Valve Co.

20—DUAL-PURPOSE UNITS—heater, heat exchanger

SRX Superheater - Heat Interchangers are announced for use on air conditioning and refrigeration systems to assure full utilization of evaporative surface and

MICRO *precision switches*

...THEIR USE IS A PRINCIPLE OF GOOD DESIGN



Here is a compact 2-circuit limit switch that meets a wide variety of plant applications

This MICRO precision switch is designed to meet every requirement for a compact 2-circuit switch for use as a limit, safety or interlock switch on complex production equipment.

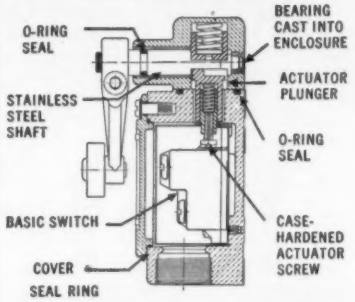
It has small size, extreme versatility, precision, reliability and ruggedness. All moving parts and the switching chamber are completely sealed, protected from wear or becoming fouled. Field adjustability permits its use in any type of application or location

Two-circuit contact arrangement allows flexibility in circuit design. Reliability of the precision, snap-action unit assures accurate repeat operation throughout many millions of hard, fast actuations. Although small and compact in size, this switch is not only a precision instrument. It is designed and built to stand the most severe abuse.

The electrical rating is: 10 amperes 120, 240 or 480 volts a-c; ½ H.P. 115 volts a-c; 1 H.P. 230 volts a-c; .2 ampere 115 volts d-c; .1 ampere 230 volts d-c; .04 ampere 550 volts d-c. Pilot duty rating is: 600 volts a-c, max.

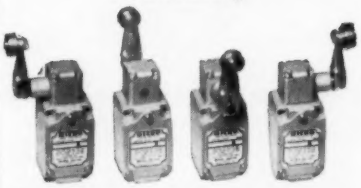
Like many other precision switches in the MICRO SWITCH line, this versatile 2-circuit switch is an ideal component for installation on present plant equipment. MICRO precision switches make production machinery safer, more automatic and more productive.

Seals Provide Maximum Protection



Sealing is provided by use of O-ring seals on the actuator shaft and between the actuator head and the housing. A synthetic rubber ring seal is provided for the cover. These seals provide maximum protection against entrance of dust, oil and other liquids. The switch meets NEMA specifications for an oil-tight pilot device.

Adjustable Head Assembly



The switch is easily mounted in almost any location. The user can remove the head and locate it in any of 4 positions (as illustrated).

Field Adjustable Actuator

The roller arm actuator is field adjustable through 360 degrees, positively locking in any position. Actuators are assembled to operate in either direction. They can also be converted to operate in one direction only, clockwise or counterclockwise

Send for new catalog 83 on industrial enclosed switches.

MICRO precision switches are sold by distributors in key cities everywhere. Look under "Switches, Electric" in the yellow pages of your phone book.

MICRO SWITCH

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

In Canada, Leaside, Toronto 17, Ontario • FREEPORT, ILLINOIS

For more facts circle 580 on Reply Card

How Norgren AUTOMATIC-DRAIN Air Line Filters REDUCE WEAR On Air-Equipment

...End cost of manual draining

1 Abrasive Materials Filtered
Abrasive materials such as grit, pipe scale and rust are automatically filtered from compressed air lines.

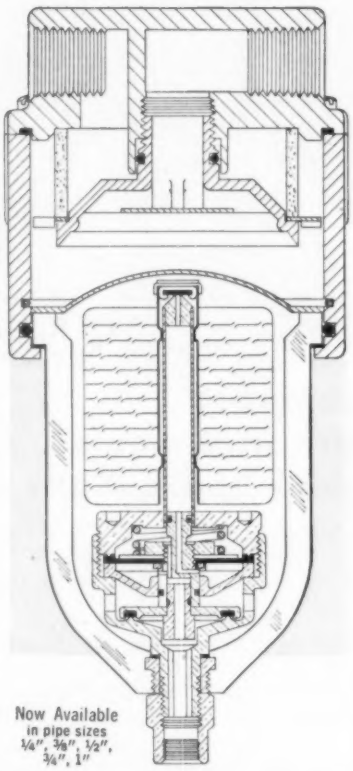
2 Corrosive Liquids Removed
An efficient baffle creates a strong centrifugal action that "wrings" oil and corrosive moisture from the air.

3. Liquids Drained Automatically
Collected liquids are automatically drained through a float-controlled, pilot-operated mechanism that discharges only when the liquid reaches a designated level, reducing air requirements, and eliminating unnecessary draining action.

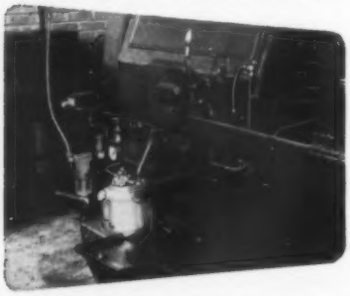
4 Drain Independent of Air Flow
As long as there is pressure on the system the drain operates around the clock, with or without air flow.

5 Choice of Filters
Standard filter is a reinforced 200 mesh Monel wire screen (74 micron). Optional filters are 64 and 25 micron sintered metal.

6 Trouble-Free Drain Operation
Solids are prevented from entering the drain mechanism to prevent clogging and assure trouble-free operation. A transparent bowl provides a clear view of liquid accumulation and the drain action.



Now Available in pipe sizes ¼", ⅜", ½", ¾", 1"



Here, an automotive electrical equipment manufacturer uses Norgren MICRO-FOG to completely lubricate a ⅝" multiple spindle automatic screw machine. On this machine and on many others in the plant, a Norgren Automatic-Drain Filter protects regulator, lubricator, gears and bearings by removing abrasive solids and corrosive liquids from the air line system.

Without obligation, learn how Norgren Automatic-Drain Air Line Filters can reduce costs in your plant. Call your nearby Norgren Representative listed in your telephone directory—or WRITE THE FACTORY FOR NEW No. 700 CATALOG.

C. A. Norgren CO

3443 So. Elati St., Englewood, Colo.

Wherever Air is Used in Industry

For more facts circle 581 on Reply Card

NEW PRODUCTS

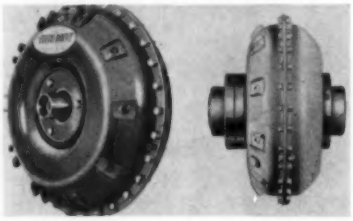
(Begins on page 136)

eliminate problem of having part of the surface being used for superheating the refrigerant. Units combine a superheater with a heat exchanger featuring an inner-fin construction said to provide maximum heat transfer with minimum pressure drop. Available in capacities from 1 through 100 tons, units sub-cool the liquid refrigerant, company states, thereby improving expansion valve operation and increasing efficiency of evaporator due to reduced flash gas. Heat-X, Inc.

Use the Reader Service Cards provided on pages 187-188 to ask for more information on these products. Circle item numbers of products in which you are interested.

21—FLUID DRIVE for general industrial use

Size 126 Type T Gyrol Fluid Drive is an improved traction type unit for use with internal combustion engines as a fluid power transmission for mobile material handling vehicles and construction equipment. Power rating in these applications is 25 to 85 hp, depending on drive speed. When modified by installation of a flexible half on each end of the drive, the unit is declared suited to constant speed electric motor applications for driving production and processing equipment, machine tools and conveyors. As a motor driven unit, the drive is rated 7½ to 15 hp for 1200 rpm drive speed and at 25 to 50 hp for 1800 rpm. Dimensions for the basic unit are 7⅛ in. over the shaft and 14$\frac{13}{16}$ in. OD. Overall length for the electric motor arrangement is 10$\frac{13}{16}$ in. American Blower Corp.



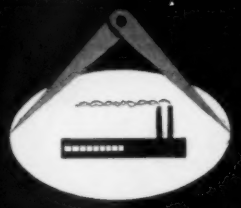
22—FIRE ALARM SYSTEM for the large buildings

For industrial plants and multi-storied structures, this manual fire alarm system, the Type SSA, serves to indicate location of the fire and effect immediate evacuation of occupants. It is designed for simple testing and scheduled fire drills. Manual alarm stations are operated by a single action; signals may be single stroke bells, chimes or horns. Warning devices and alarm stations are

Using

DU PONT ELASTOMERS

NEOPRENE-HYPALON®

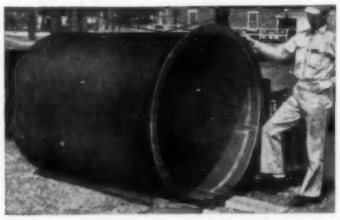


in Industry

HYPALON® tank linings for strong oxidizing agents

Now a wide range of chemicals can be safely handled by storage tanks and shipping containers for long periods. The secret is a lining made of HYPALON, Du Pont's new synthetic rubber. Tank linings of HYPALON have extra-high resistance to chemicals—even the strongest oxidizing agents have little effect on linings of HYPALON.

But exceptional chemical resistance is just part of the story: HYPALON also withstands temperatures from 250°F. to 350°F. It is *completely unaffected* by ozone and can take prolonged exposure to weathering and sunlight without deteriorating.



TANK LINED with HYPALON for storage of calcium hypochlorite. HYPALON is applied by standard lining methods, adheres firmly.

HYPALON can provide extra-high durability to products exposed to severe service conditions; such as hose for handling strong acids and hot fluids; gaskets and packings in high-temperature service; protective coatings for metal and masonry; and many others. To become acquainted with Du Pont HYPALON—just clip and mail coupon.

For more facts circle 582 on Reply Card

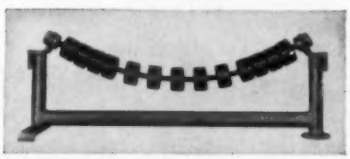
Flexible NEOPRENE idlers for conveyor belts outlast steel idlers better than 8 to 1

NEOPRENE IDLERS are still in service after two years. Accumulated sand previously fouled the steel idler bearings, stopped the idlers and damaged the belt. Average service was three months.

NEOPRENE resists abrasive action of sand, retains its flexibility

At one point in the production of castings at a magnesium foundry in the Midwest a conveyor belt carries molding sand from a chute up a 35° incline to another belt. Sand builds up under the belt. When the belt ran on steel idlers, sand fouled the bearings, jammed the idlers and damaged the belt. Average service life of the steel idlers was three months.

The manufacturer decided to install flexible idlers made of neoprene. The new idlers, developed by Joy Manufacturing Company, consist of neoprene discs permanently bonded to a flexible neoprene-sheathed steel cable and suspended from a single sealed bearing at each end. These end bearings are up out of the sand so spillage does not affect them. The discs supporting the belt, being flexible, conform to the shape of irregular loads, reducing loss of material through spillage. The idlers clean themselves because constant flexing forces the sand from between the rotating discs. Neoprene was the natural choice for this use because of its lasting resilience and resistance to the abrasive action of the sand. After two years—*more than eight times the service life of the steel idlers*—the neoprene idlers are still on the job.



NEW IDLERS consist of resilient neoprene discs permanently bonded to a flexible neoprene-sheathed steel cable which is suspended from a single sealed bearing at each end.

Specifying neoprene in the rubber products you use can lower replacement and maintenance costs. Of all general-purpose elastomers, only neoprene possesses a *balanced combination of properties*. For more information on neoprene, mail the coupon below.

DU PONT
REG. U. S. PAT. OFF.

HYPALON *is a registered trademark of E. I. du Pont de Nemours & Co. (Inc.)*

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Please send further information and add my name to the mailing list for your free publications, the "Neoprene Notebook" and "Facts about HYPALON®," which show how the Du Pont elastomers are used to cut maintenance and replacement costs, improve production.

E. I. du Pont de Nemours & Co. (Inc.)
Elastomers Division, Dept. PL-8
Wilmington 98, Delaware

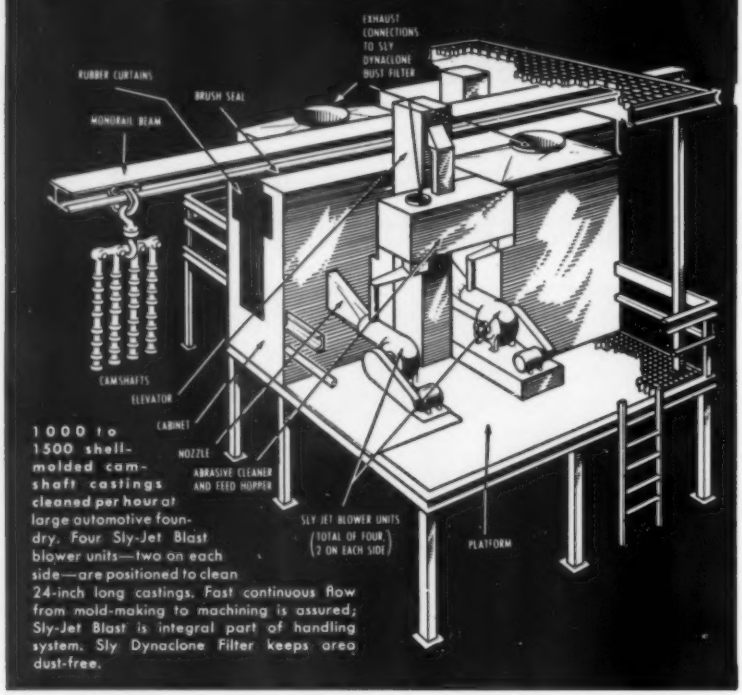
Name_____ **Position**_____

Firm_____

Address_____

City_____ **State**_____

NEW LOW-COST WAY TO CLEAN SHELL-MOLDED CASTINGS



1000 to 1500 shell-molded camshaft castings cleaned per hour at large automotive foundry. Four Sly-Jet Blast blower units—two on each side—are positioned to clean 24-inch long castings. Fast continuous flow from mold-making to machining is assured; Sly-Jet Blast is integral part of handling system. Sly Dynaclone Filter keeps area dust-free.

NEW SLY-JET BLAST

Eliminates need for air compressor . . . Eliminates maintenance costs of airless wheels

Now, clean shell-molded castings faster, at lower cost. With new, *low-velocity* Sly-Jet Blast, cleaning action is thorough yet "gentle"— therefore, no pitting, no removal of parent metal, no warping or distortion as with other cleaning methods. *Efficient*—abrasive is accurately directed over a large work area through a stationary nozzle, which can be set at any angle from horizontal to vertical. *Economical operation*—blower unit is powered by electric motor; there is no compressor, no need for high horsepower. *Long, trouble-free operation*—there are no moving parts in the blast zone; abrasive is introduced directly into the nozzle. *Versatile*—nozzle opening can be in any shape from circular to rectangular and any size. Abrasive can be any grade of sand, most grades of grit. *Non-stop operation*—cleaning mechanisms can run continuously for effective integration in continuous-flow handling systems.

Take the problem and expense out of cleaning shell-molded castings. Write today for the facts on new Sly-Jet Blast.

THE W. W. SLY MANUFACTURING CO.

SINCE 1874

4600 TRAIN AVENUE • CLEVELAND 1, OHIO

OFFICES IN PRINCIPAL CITIES

For more facts circle 583 on Reply Card

NEW PRODUCTS

(Begins on page 136)

wired through a closed-circuit to a supervisory control panel energized from a 115/230-v, 60-cycle, three-wire a-c source. The control panel consists of supervisory relays, fuses, a milliammeter and terminals for alarm station and warning device circuits. A trouble bell is provided for operation when circuits are accidentally opened or grounded. Edwards Co., Inc.

23—POINT INDICATOR cuts math and layout time

The Miracle Point Indicator is designed to reduce computing and layout time in joining, shaping, drilling and milling. A combination angle-finding, center-locating and leveling device, the instrument consists of a mercury-balanced level and degree-calibrated dial enclosed and mounted on a magnetized V-base. According to

company, the indicator automatically determines angles and center points. When its base is placed against a surface, such as a board to be leveled, or metal stock to be shaped, the instrument will read off the angle at which the work is being held. It is claimed accurate within 3 min of a degree. Two Alnico-V magnets hold the indicator on metallic objects, leaving the operator's hands free.

To find the center of an object, such as a section of bar stock, the indicator is placed astride it, and turned until the dial reads zero. The V-base junction indicates exact center. A center punch runs through the instrument to aid in marking hole locations. Similarly, points can be located at any angle on material to be worked. The instrument sells for around $25. Racine Instrument Co.

24—ATTACHMENT for vertical, horizontal boring

For use on Model H-3 and H-5 Hydrocranes, this auger attachment drills holes to 28 in. dia. Maximum depth capacity is 40 ft. Attachment consists of cutter head, 4-ft auger flight sections, hydraulic motor and gear box, torque arm extending from motor bracket to boom, and drain hose. Among its vertical applications are utilities work, fence posts, pilings, footings, elevator shafts and foundation

Eliminate overhead wiring hazards . . . provide for every power requirement

SPECIFY

JUMBODUCT

INDUSTRIAL UNDERFLOOR ELECTRICAL RACEWAYS

National Electric Jumboduct is designed to eliminate the hazards of overhead wiring and to provide plenty of capacity to meet the power requirements of production line wiring.

Jumboduct permits flexible plant layouts by providing readily accessible electrical distribution in the floor at a minimum cost.

A Jumboduct system in your plant means:

Plenty of capacity

4″ x 4″ Cross Section—more room for wires

Efficient power distribution

2″ pipe threaded outlets every 24″ permit exact location of equipment

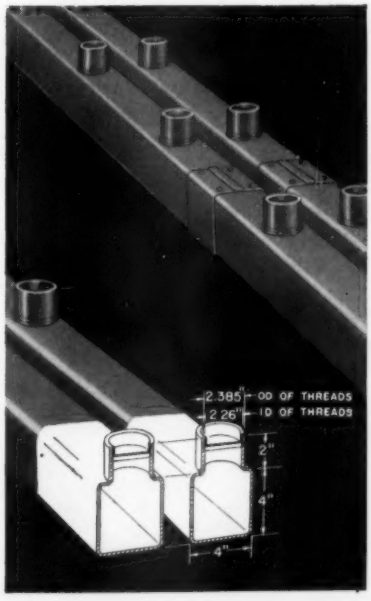
Low Cost

- Easy-to-handle 10′ lengths
- Same simple installation procedure as standard Nepcoduct
- Quick access to inserts
- Investment in conductors limited to today's needs with ample space for tomorrow's additions

Safety

- Protected against corrosion by Sherardizing method of galvanizing
- Top-coated with a baked-on acid-resisting enamel
- A completely grounded all-steel system

Get the details on JUMBODUCT today! Write for your free copy of the engineering Data Book on NE JUMBODUCT.



National Electric Products

PITTSBURGH, PA.

3 Plants • 10 Warehouses • 36 Sales Offices

For more facts circle 584 on Reply Card

Look what Ransburg Electrostatic Spray painting is doing in this eastern job shop, the Del-Val Finishers Division of J. W. Rex Company, Lansdale, Pa.

As a job shop, Del-Val handles a variety of work each month, painting hundreds of thousands of pieces and parts of various sizes and shapes.

The versatility and flexibility of Ransburg Electro-Spray makes it ideal for their varied painting requirements. Here's a typical example. Del-Val recently completed a contract for a Philadelphia manufacturer of barbecue trays with these results:

RANSBURG *Electro-Spray* **DOES IT BETTER... FOR LESS**

50% INCREASE IN PRODUCTION

50% SAVINGS IN LABOR and OVERHEAD

66% CUT IN PAINT COSTS, with improved, more uniform, and higher quality finish.

The job—flat sheet steel, 11" x 19"—enamel coated to withstand a 90 bend with sharp radius. Full coat one side; mist coat other.

WITH RANSBURG ELECTRO-SPRAY		BY FORMER HAND SPRAY	
Output, 375 panels per hour with 3 men		Output, 250 panels per hour with 4 men	
	per panel		per panel
Labor and overhead	.06	Labor and overhead	.12
Paint & lease cost	.017	Paint cost	.044
TOTAL COST	.077	TOTAL COST	.164

Want to know what Ransburg Electro-Spray can do for you in YOUR finishing department? Write for our new No. 2 Process brochure. It tells the WHAT & HOW of electrostatic spray painting, and with numerous production-line examples, shows how other manufacturers are cutting finishing costs... increasing production, and improving the quality of their work with Ransburg equipment. Too, we have available now a new movie, "The Big Attraction," a 27-minute sound and color film on electrostatic spray painting.

Ransburg ELECTRO-COATING CORP.
Indianapolis 7, Indiana

RANSBURG

For more facts circle 585 on Reply Card

NEW PRODUCTS

(Begins on page 136)

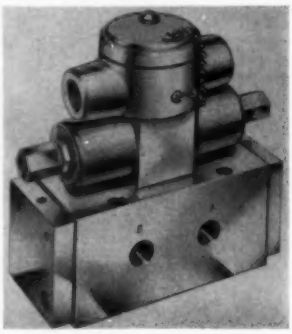
underpinning. For horizontal work under street, sidewalks, lawns, driveways and railroad tracks, the following jobs can be handled: water mains, sewers, gas mains, electric and telephone conduits. Auger diameters range from 3 to 28 in. Cutter heads are fitted with carboloy teeth, and heads for drilling various materials are available. Bucyrus-Erie Co.

25—RUST PENETRANT unlocks frozen nuts, studs

Rust Release, which comes in a 16.2-oz aerosol container, is claimed to penetrate and unlock rusty bolts, nuts, or other parts almost immediately—and to remove corrosion and supply lubrication at the same time. Reasons given for its rapid action are its formulation of chemicals and oils, and the fact that it reaches areas otherwise inaccessible. It costs around $1.70. Krylon, Inc.

26—AIR VALVES for three-, four-way operation

Solenoid and master Flo-Line Air Valves for three-and four-way operation are introduced in sizes of ¼, ⅜, ½, ¾, and 1 in. They are used for controlling air



cylinders and other air-operated devices. Dependable performance, safe operation, easy maintenance are among advantages announced, and these are attributed to use of such materials as aluminum, brass and stainless steel, few moving parts, and 0-ring sealing of the aluminum spool. Parts subject to wear are readily replaceable. The valves have a built-in junction box for convenient piping of conduit. Bulletin 260 covers Flo-Line Valves. Hanna Engineering Works.

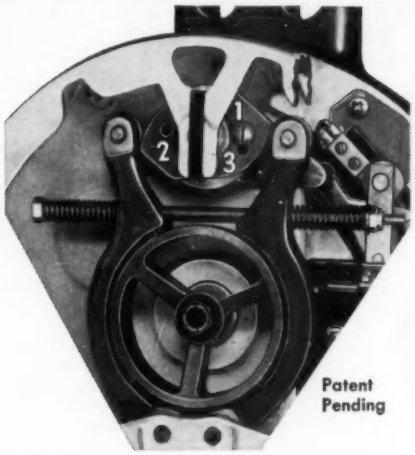
27—FLOOR PATCH takes trucks within the hour

According to manufacturer, Sonopatch can be trucked over an hour after application. This material is described as a non-bituminous powdered mixture which "sets-up" in 30 min under normal drying conditions. It is claimed to yield compressive strength of 2000 psi after a few hours and to be ultimately capable of supporting loads of more than 10,000 lb.

For more facts circle 586 on Reply Card ——→

ACCO products

The WRIGHT Hoists for Dependability



Patent Pending

Nothing to adjust but the cam!

Here's your assurance of maximum hoist service—minimum downtime. Adjustment of this cam-actuated brake to compensate for brake lining wear is simple as ABC.

When excessive load hook drift occurs...remove the screw shown at Position 1 (*see picture*), swing the cam until Position 2 is in line and replace the screw. That's all there is to it. For the final third of brake lining wear, set the cam at Position 3.

This is the only adjustment required. Brake springs and solenoid are factory-set and never need adjustment.

for complete information on WRIGHT Hoists and Crane components ask for:

Speedway Hoists: *(Frame 1) Booklet DH133B, (Frame 2 & 3) Catalog E55A* • ***Motor Driven Cranes:*** *Underhung, Single Bridge, Bulletin #227; Top Running, Bulletins #DH448 or DH449* • ***Crane Drive Units:*** *Booklet DH-431A* • ***Hand Traveling Cranes:*** *Bulletins #DH-468 and #DH-348B*

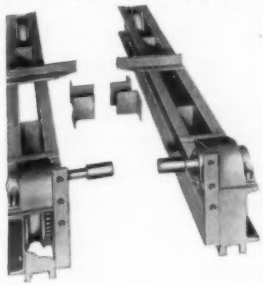
Write our YORK, PA., office

HOISTS, CRANES AND DRIVE UNITS TO FIT YOUR OPERATION

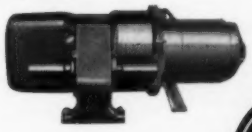
WRIGHT *Speedway* Hoists are designed to meet the many and varied demands of modern high speed production.

They are available in Frame 1, 1½, 2 and 3 sizes with capacities from ¼ to 10 tons.

WRIGHT B-514 Crane End Trucks are constructed of structural steel-welded steel channels equipped with heavy channel diaphragms. Truck wheels are equipped with Timken Tapered Roller Bearings (two to each wheel).



WRIGHT Crane Drive Unit consists of an electric motor with a fluid coupling transmitting power to a well proportioned gear reduction. It is designed for crane and double-beam trolley propulsion and similar intermittent duty reversing applications.



ACCO

Wright Hoist Division
AMERICAN CHAIN & CABLE

York, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

Better Value

THIS MINSTER No. 4 PRESS IS INSTALLED WITH ONE

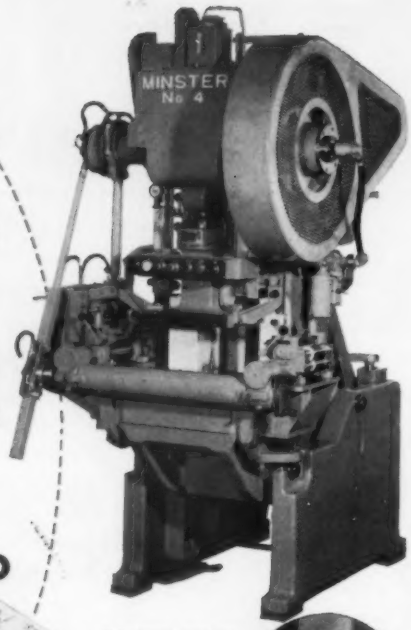
VINYL

Air-Loc ® 4-17-4

"PACKAGED FLAT" *

ONLY $12.95

POSTPAID IN U.S.A.



This impact machine installed on 8 mounts 4½" x 4½" to provide double thickness under each foot.

Air-Loc ® 4-17-4 **THE VINYL MOUNT that dampens vibration, gives you these advantages . . .**

1. VINYL CONSTRUCTION is impervious to oil, water, alkali and weak acids. 2. EASY TO CUT with a power saw. 3. PERMANENT MACHINE ALIGNMENT. 4. PRECISION SHIMMING is easy. 5. REUSABLE when relocating machines. 6. NO "WALKING", anchored by friction without bolts or cement. 7. REDUCES VIBRATION up to 85% due to patented construction.

- Use one "Packaged Flat" to prove this in your own plant.

ONLY $12.95

POSTPAID IN U.S.A.

* Each package contains one 9" x 18" sheet of **Air-Loc** 4-17-4, one sheet of **Air-Loc** shim holding material and instructions for easy installation of 1 to 3 machines. Each mount ¾" thick is made up of one piece of each type of **Air-Loc**.

AIR-LOC DIVISION

Clark, Cutler, McDermott Co., Franklin, Mass.

NAME _____ (Please print)

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COMPANY _____

ADDRESS _____

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☐ Please send one "Packaged Flat @ $12.95 postpaid, U.S.A.

☐ Please send samples and booklet about Air-Loc.

For more facts circle 587 on Reply Card

NEW PRODUCTS

(Begins on page 136)

After 24 hr it hardens enough to support loads under steel casters, company announces.

For application, Sonopatch is mixed with water and poured in place to desired thickness. It is self-leveling, non-shrinking and firm bonding, says company, and you can paint over it within 24 to 48 hr, depending on drying conditions. Sonopatch is light gray in color; about 4½ lb of it repairs a floor section 1 ft square and ½-in. deep. Sonopatch is also suggested for use in bolt-setting; it is poured around the bolt which has been positioned in the floor, then allowed to harden. L. Sonneborn Sons, Inc.

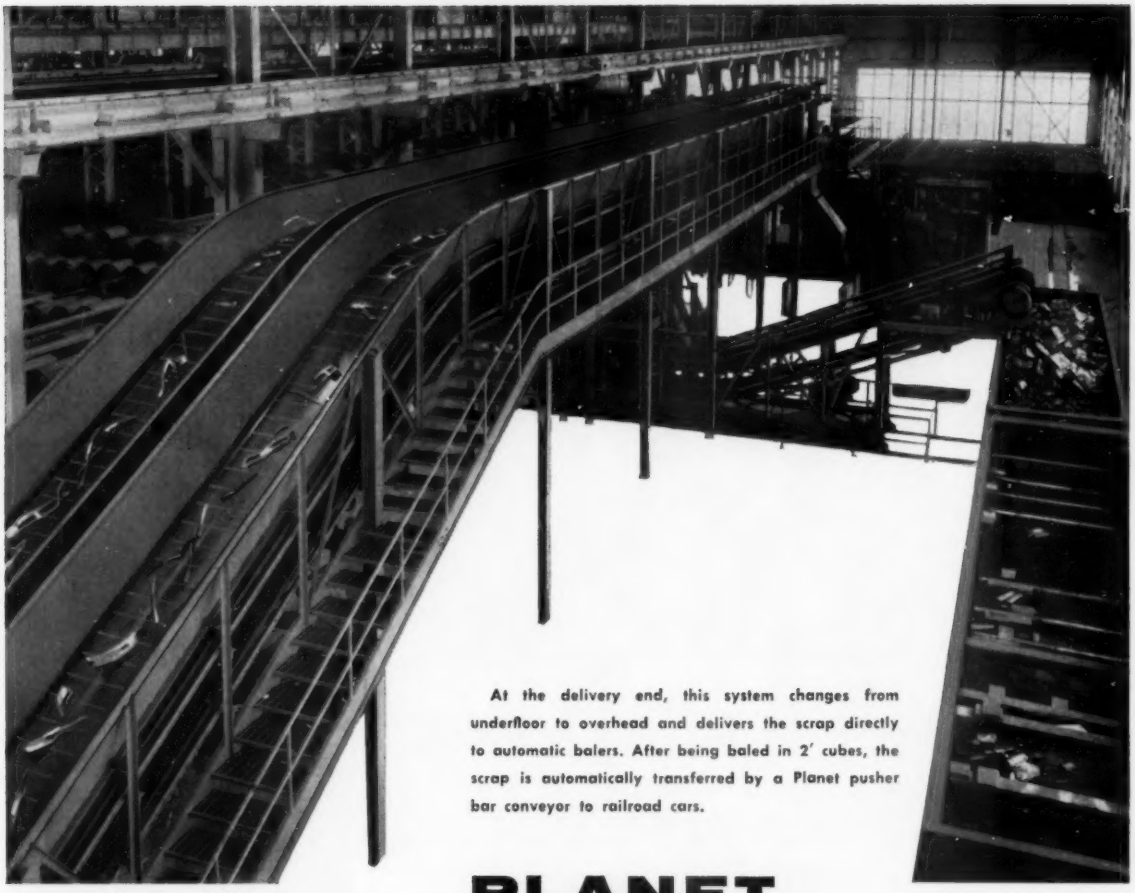
28—PLATFORM aids in rail car loading jobs

This portable magnesium platform enables use of company's Yard Ramp for rail car loading even when track side space is limited. When track side space permits, the 30-ft long Yard Ramp is positioned at the rail car door opening for straight-in loading. For plant without enough track side space for such positioning, this manufacturer designed the platform to require less than a 10-ft wide strip alongside the rail car.

The 96-by-96 in. platform is reported simple to use. A lift truck positions it at the car door opening, and the Yard Ramp is positioned at one side of the platform, parallel to the track. A Dockboard bridges gap between platform and car. The loaded lift truck travels from ground level up the Yard Ramp, onto the platform, over the Dockboard and into the car. Adjustable height legs permit easy leveling of platform and safety curbs around the platform deck prevent run-offs, yet can be removed for simultaneous loading from two or three sides. Platforms come in capacities from 6000 to 16,000 lb.; their average weight is 772 lb. Magnesium Co. of America.

29—WET CUTTING BLADES for hard, soft masonry

With the CBR-500 Series of wet cutting triple-reinforced abrasive blades, masonry saw users are said to have a break-resistant blade suited to the entire range of masonry materials from hard to soft. Similar to its dry-cutting counterpart, company's Polk-A-Dot Series CBR-900, the new wet cutting series is reinforced



At the delivery end, this system changes from underfloor to overhead and delivers the scrap directly to automatic balers. After being baled in 2' cubes, the scrap is automatically transferred by a Planet pusher bar conveyor to railroad cars.

This Planet apron conveyor, moving through a tunnel under trim presses, automatically delivers to the balers up to 20 tons of loose scrap per hour. A simple clutch-operated auxiliary drive assures continuity of operation.

PLANET
ENGINEERED SYSTEM
automatically handles 20 tons of scrap per hour

For a leading automobile plant, Planet recently engineered and installed a 1200 foot system to handle the scrap from trim presses having a combined capacity of over 4000 tons. Because the entire operation is automatic, this scrap handling system saves time and money . . . and baled scrap is worth more, too.

It paid this manufacturer to use Planet's engineering know-how. If you have a scrap handling problem it will pay you to write or phone today and "PLAN WITH PLANET"

PLANET CORPORATION

- ENGINEERED HANDLING SYSTEMS
- AUTOMATED EQUIPMENT
- FOUNDRY HANDLING SYSTEMS

65

1840 SUNSET AVE., LANSING, MICH.

For more facts circle 588 on Reply Card

Crampons prevent slipping on mountain ice, but

Pattern one-half actual size

every step is a SAFE step on low cost A.W. SUPER-DIAMOND

ECONOMY ROLLED STEEL FLOOR PLATE

Where foot safety—with economy—is a *must*, specify A.W. SUPER-DIAMOND. Secrets of SUPER-DIAMOND's anti-slip protection are the raised diamond-shaped steel figures. Alternately spaced at right angles and correct distances, these raised figures provide safe, foot-gripping friction from any angle of approach.

SUPER-DIAMOND is tough, rolled steel floor plate—can be fabricated with ordinary shop equipment—presents no matching or waste problems—cleans and drains rapidly. Use it structurally, as an overlay or complete flooring.

No other floor plate can match A.W. SUPER-DIAMOND'S *safety, durability and easy maintenance at so low a cost.*

A.W. SUPER-DIAMOND

ROLLED STEEL FLOOR PLATE

"The diamond in the rough . . . a gem of a flooring."

ALAN WOOD STEEL COMPANY
Conshohocken, Pa.

Please send A.W. SUPER-DIAMOND Booklet SD-9

Name_____

Title_____

Company_____

Address_____

City_____ Zone_____ State_____

Other products: A.W. ALGRIP Abrasive Rolled Steel Floor Plate—Plates—Sheets—Strip—(Alloy and Special Grades)

For plants where oil, water and grease raise special problems of slipping accidents, we suggest a check on the special qualities of A.W. ALGRIP . . . the world's only abrasive rolled steel flooring.

For more facts circle 589 on Reply Card

NEW PRODUCTS

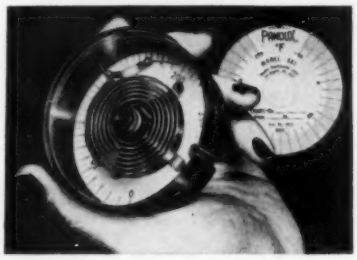
(Begins on page 136)

throughout with Fiberglas webbing, with the center of the blade having extra reinforcing. The blades come in 14-in. diam in a range of specifications for hard to soft materials. Prices range from around $6.00 each in the 10-19 bracket (less than that in quantities). Clipper Mfg. Co.

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 187-188. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

30—THERMOMETER is low priced recording unit

The Pandux Recording Maximum-Minimum Thermometer measures ambient temperatures and records both lowest and highest values over a given period. It features a replaceable paper chart on which a permanent record of temperature



excursion is recorded. The chart can be replaced and filed for future reference by simply unscrewing thumb nut in bottom of case. Available in two ranges Model 581-F with 50 to 250 F, and Model 581-C with —50 to 100 C, thermometer has a variety of uses. Shippers of perishables can have a permanent record of the temperatures to which the produce is subjected while in transit or in storage. Other applications are in refrigerator or freezer storage, maximum and minimum temperatures in all sorts of enclosures, temperatures in ovens, curing rooms. Both models are priced under $20. The Pacific Transducer Corp.

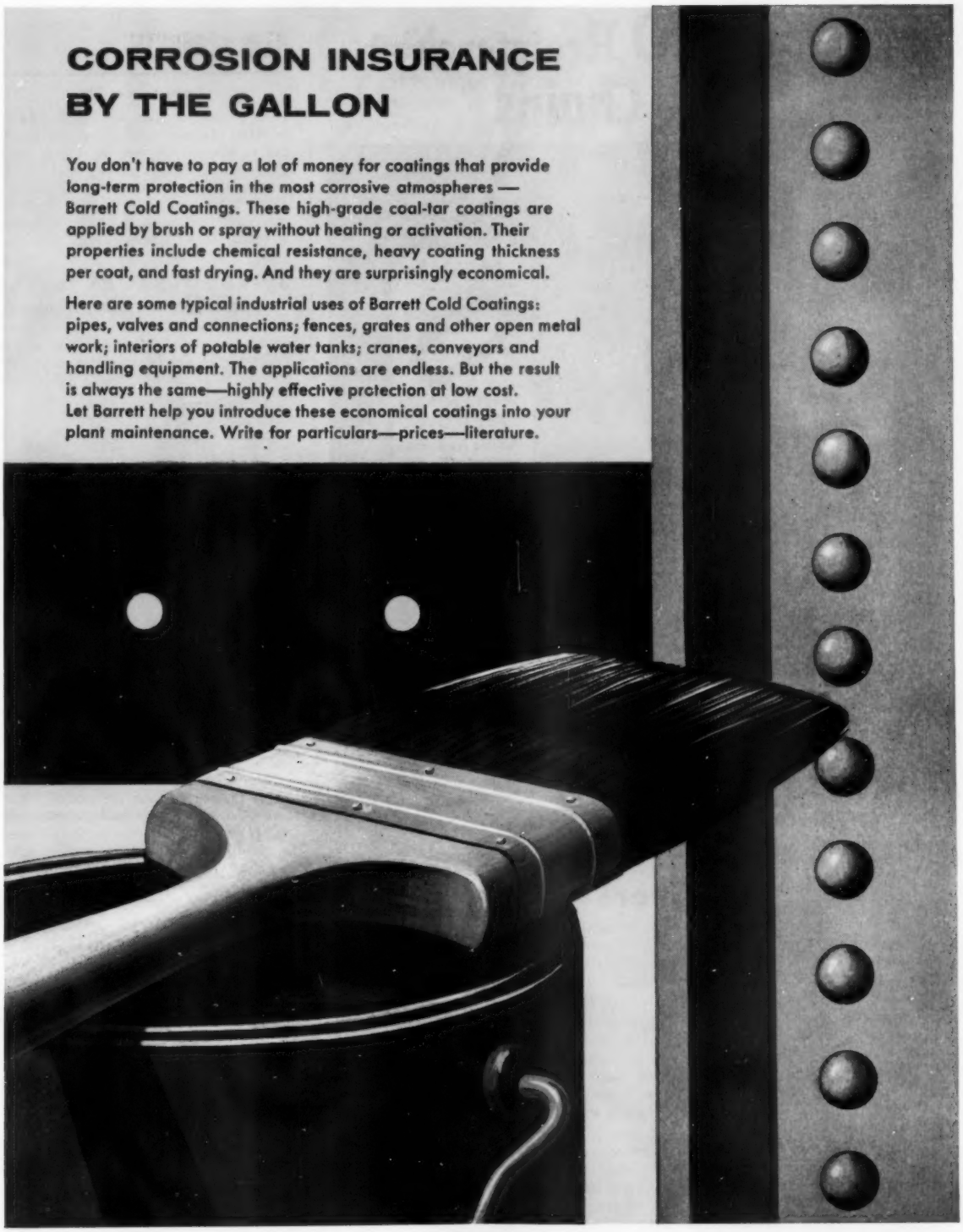
31—CLOSET BOLT CAPS need no plaster, cement

Assembling closet bolt caps on toilet bowls or urinals is reported quick and easy with Deluxe Closet Bolt Caps. They have a brass bushing which takes the place of the plated brass washer normally used under the head of the bolt or screw. A slot in the brass bushing makes it adjustable to desired position, so that the cap is properly located on any style of fixture. After the nut is installed

CORROSION INSURANCE BY THE GALLON

You don't have to pay a lot of money for coatings that provide long-term protection in the most corrosive atmospheres — Barrett Cold Coatings. These high-grade coal-tar coatings are applied by brush or spray without heating or activation. Their properties include chemical resistance, heavy coating thickness per coat, and fast drying. And they are surprisingly economical.

Here are some typical industrial uses of Barrett Cold Coatings: pipes, valves and connections; fences, grates and other open metal work; interiors of potable water tanks; cranes, conveyors and handling equipment. The applications are endless. But the result is always the same—highly effective protection at low cost.
Let Barrett help you introduce these economical coatings into your plant maintenance. Write for particulars—prices—literature.



Barrett®

PROTECTIVE COATINGS

BARRETT DIVISION, Allied Chemical & Dye Corporation, 40 Rector Street, New York 6, N. Y. In Canada: The Barrett Company, Ltd., 5551 St. Hubert Street, Montreal, Que.

OVER 100 YEARS OF EXPERIENCE

Allied Chemical

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an ACCO product

ACCO Registered* Sling Chains

NEW!
Shaped Section Master Link
Holds its form under loads up to 18% greater.
NEW!
Accoloy X-Weld 125 Chain
Welds as strong or stronger than alloy material. Welded area 2¼ times conventional size area.

* Trade Mark Registered

NOW—Better and Safer than Ever!

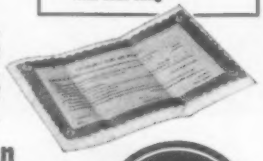
• ACCO *Registered* Chain Slings—long recognized as the standard of excellence—now give users a double bonus of safety and quality. They incorporate ACCO's new Shaped Section Master Link plus ACCO's sensational Accoloy X-Weld 125 chain.

The new Shaped Section Master Link, without any increase in weight, withstands deformation under loads up to 18% greater than a standard round section can. And the Accoloy X-Weld 125 chain—with its extra-strong, king-size welded area and its non-kinking feature—assures extra ruggedness and better service.

Because of these two spectacular improvements, there is more reason than ever for standardizing on ACCO *Registered* Slings. For additional interesting information, call your ACCO *Registered* Distributor—or write our nearest District Office.

WHAT "ACCO REGISTERED" MEANS...

1 The best material
2 Unit safety factor (on bodies, rings, links, hooks)
3 Proof test of complete sling to twice the working load limit
4 Actual field service test of each design
5 Metal identification ring on each sling
6 Signed Registry Certificate with each sling



ACCO
American Chain Division
AMERICAN CHAIN & CABLE

TRADE MARK

York, Pa., Atlanta, Boston, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.

plus Rings Links Hooks

For more facts circle 591 on Reply Card

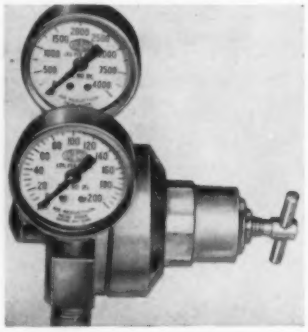
NEW PRODUCTS

(Begins on page 136)

and tightened, it holds the bushing firmly in place, manufacturer states; the plastic cap is screwed on and the job is done. Caps are phenolic plastic, said to be practically indestructible and to retain a white color indefinitely; they may be unscrewed and re-used when the fixture is reset. J. A. Sexauer Mfg. Co., Inc.

32—REGULATORS for the smaller welding shops

Airco Series 8000 Regulators are low-priced, inverse-type oxygen and acetylene pressure regulators designed to meet the needs of smaller metal fabrication



shops where initial costs are a factor. Compact in design, the two-gage type measures 4½ by 4½ in. and weighs 2 lb 4 oz; the single gage regulator measures 3½ by 5½ in., weighs 2 lb 1 oz. The body is a machined brass forging and the spring case a zinc die casting. For maximum readability, the brass pressure gages have crowned, clear crystals. Other features announced include: molded rubber diaphragm with fabric insert for strength, easy accessibility to internal parts, relief valves on oxygen regulators. Air Reduction Sales Co.

33—SIGNAL warns when truck is overloaded

For use on manufacturer's sit-down industrial trucks, the overload warning signal warns the driver—by light or bell—that the load he has picked up is in excess of the truck's safe operating capacity, or has shifted to a dangerous position. The attachment consists of a vacuum switch and a bell or light. The switch is attached to the hydraulic system of the Hydra-Lizer (standard equipment on these trucks) which consists of two hydraulic cylinders on which the steer (rear) wheels are mounted. The cylinders are interconnected to compensate for any unevenness up to 3 in. that may occur in the floor.

Industrial trucks are constructed similar to a teeter-totter, it is explained, with the counterweight, on the rear, offsetting the weight of the load. When the truck is overloaded, or incorrectly loaded, the steer wheels start to raise off the floor. As they do so, hydraulic

9,121 ways to valve corrosive substances with HILLS-McCANNA valves

36 BONNET ASSEMBLIES

HANDWHEEL OPERATED—13 types including models with indicators, auxiliary handles, enameled bonnet and outside stem and yoke.

QUICK OPENING—2 lever operated models go from full open to full closed in a 180° turn.

SLIDING STEM—5 models to permit adaptation to a wide variety of operators.

EXTENDED STEM—2 models provide easier operation in difficult locations.

CHAINWHEEL OPERATED—1 model.

AIR OPERATED—9 models offered with a choice of air cylinder or diaphragm motor operators.

UNBALANCED HYDRAULIC OR PNEUMATIC—1 model utilizing pressure on valve diaphragm to close, line pressure to open.

MOTOR OPERATED—3 models providing a choice of electric motor operators.

14 DIAPHRAGMS

RUBBER—3 types including high acid/alkaline resistant, abrasion resistant and temperature resistant.

NEOPRENE—5 types including acid, alkaline, oil and heat resistant formulations, freeze resistant and white, noncontaminating formulations.

HYCAR—acid, oil and heat resistant.

TYGON—acid resistant.

COMPAR—solvent resistant.

KEL-F—acid resistant.

POLYETHYLENE—acid resistant.

TEFLON—maximum chemical resistance.

27 BODIES

CAST IRON—ASTM Class 3 minimum.

CAST STEEL—standard foundry finish.

CAST IRON, LINED—choice of 8 linings including hard or soft rubber, neoprene, glass, lead, Saran and Lithcote.

CAST IRON, COATED—Stalpic coated.

ALLOY—choice of 10 alloys including several types of stainless steel, Durimet, Everdur, Monel and Hastelloy.

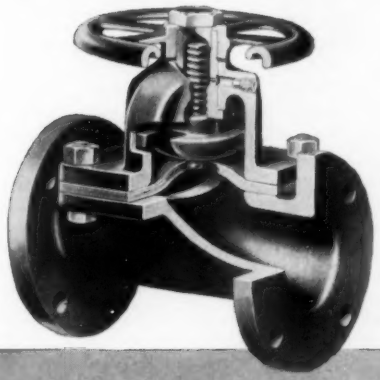
ALUMINUM—Cast.

NICKEL—97%+ pure.

PLASTIC—Choice of 4 materials: polyvinyl chloride, Uscolite, Saran or polyethylene.

In this unmatched selection of operators, diaphragms and body materials is the answer to virtually every corrosion resistant valving problem. In addition, nearly 25 years of application of the Saunders Patent valve by Hills-McCanna has developed extensive experience records on the best way to handle thousands of corrosive substances. The combination of a complete choice of materials plus Hills-McCanna "know how" is your assurance of getting the *best* valve for your service.

Hills-McCanna diaphragm valves are offered in sizes from ⅜" through 14". Dependent on size and type of body and diaphragm materials, they will handle pressures to 150 psi, temperatures to 350° F. For specific recommendations send an outline of your corrosion resistant valving problem. To have full data at hand, ask for the Hills-McCanna valve catalog.



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Corrosion Specialists Since 1870

HILLS-McCANNA CO.

2450 W. Nelson St. Chicago 18, Illinois

Manufacturers of: Saunders Patent Diaphragm Valves • Chemical Metering and Proportioning Pumps • Force Feed Lubricators • Light Alloy Castings

For more facts circle 592 on Reply Card

WANT LONGER BELT LIFE?

SWITCH TO IMPERIAL Innerlocked* BELTING

26 TIMES EXPECTED LIFE was the record of this Imperial Belt in a large foundry.

IMPERIAL BELT on this elevator lasted 8 years longer than belt used previously.

Exclusive stitching and impregnation give maximum wear resistance . . . lower belting cost

There's one sure way to reduce your ultimate belting costs . . . and that's by getting extra service life out of every belt you buy.

Imperial's exclusive INNERLOCKED* stitching and impregnating processes were developed to produce stronger, longer-wearing belts. They have been proved in hundreds of installations.

Plies won't separate

INNERLOCKED stitching permanently binds plies together. Stitches will not run even if a thread is broken or cut. Additional wear resistance is obtained by the use of special impregnating compounds developed by Imperial. These compounds lubricate, toughen and preserve the heavy-duty hard silver duck fabric which has a tensile strength exceeding 800 lbs. per inch of width.

Tell us your belting needs

Imperial Belts are job-designed for specific operating conditions. They cost less to use than any belting manufactured. Write for Catalog 54-3, describing your requirements.

**INNERLOCKED—Reg. trademark of Imperial Belting Co.*

Imperial INNERLOCKED BELTING

First in stitched canvas belting for over 45 years

You expect more from Imperial . . . and you get more!

Imperial Belting Company

1759 S. Kilbourn Avenue
Chicago 23, Illinois

For *new* conveyors and elevators, specify and insist on Imperial for lowest ultimate belt cost. Write for Catalog 54-3.

For more facts circle 593 on Reply Card

NEW PRODUCTS

(Begins on page 136)

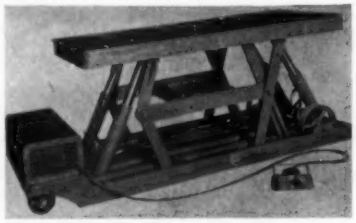
pressure in the Hydra-Lizer drops to energize the vacuum switch setting off the bell or light. Lamson Mobilift Corp.

34—COATING keeps the paint on galvanized surfaces

Metco is a metallic coating claimed to prevent paints, lacquer, enamel or other siccative coatings from peeling off the surfaces of galvanized metal. Company says this coating makes it unnecessary to use any other metal wash or priming agent on galvanized metal. Described as colorless, non-flammable and odorless, Metco may be applied by brush or a cloth saturated in the solution. Or it may be used as a bath in which to dip the product to be coated. Tests are reported to show that this coating reacts on soldered joints the same as on a galvanized surface and may be soldered over the finish. A sample bottle is offered. Solfo Paint Mfg. Co.

35—TABLE handles steel sheets at shears, presses

This 10,000-lb capacity press feed table has an electric hydraulic power unit and foot operated push button controls. The 1-hp continuous duty power unit operates



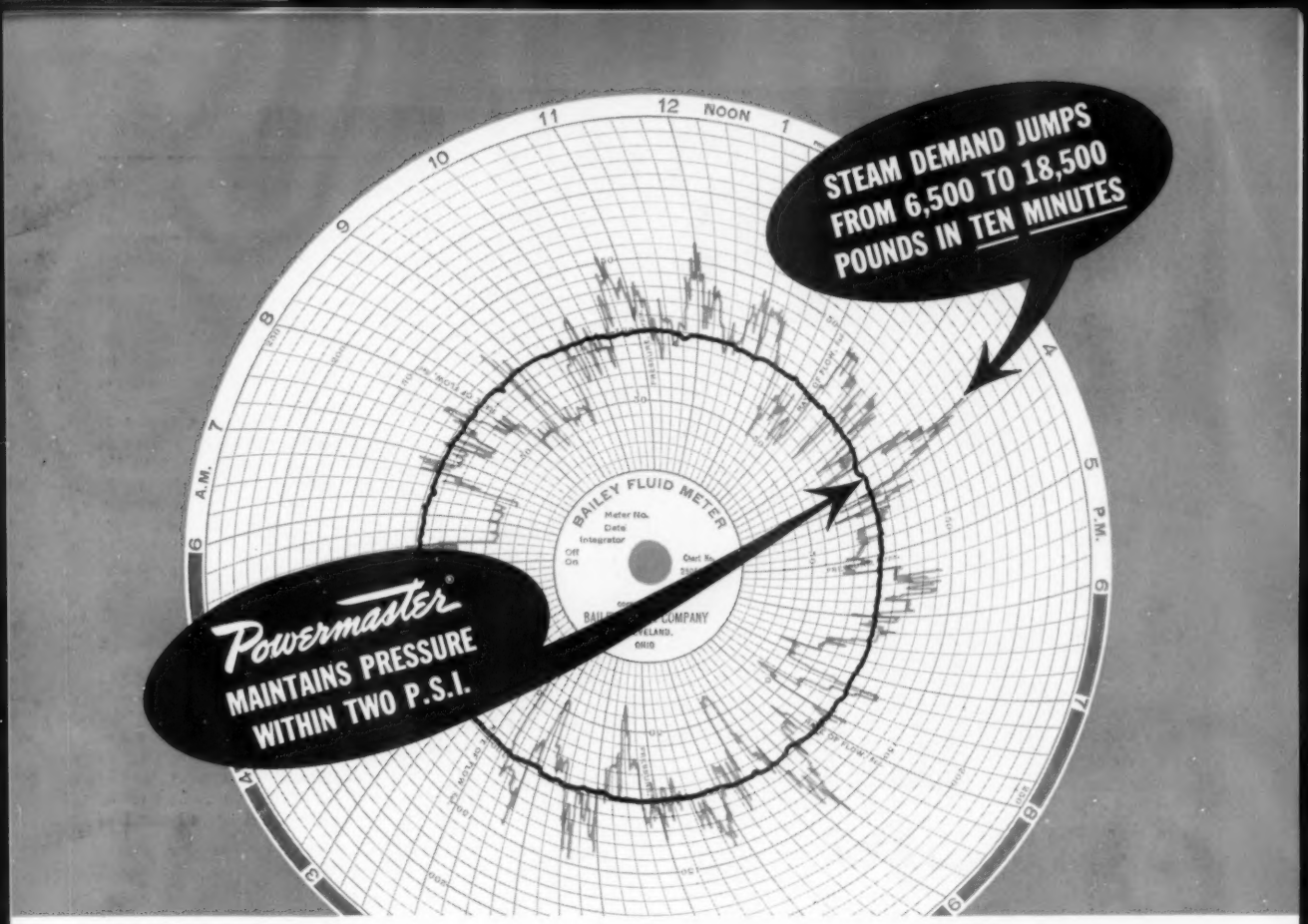
on 220-440/3/60 current. Lifting speed is 1½ fpm. The table is 78 by 36 in., and the deck height ranges from 18 to 36 in. The lift table has a built-in relief valve for protection in case of overload, and a glass wound electrically operated heavy duty solenoid relief valve. A flow regulator controls the table's lowering speed. The Colson Corp.

36—ELECTRONIC INSTRUMENT aids in noise control

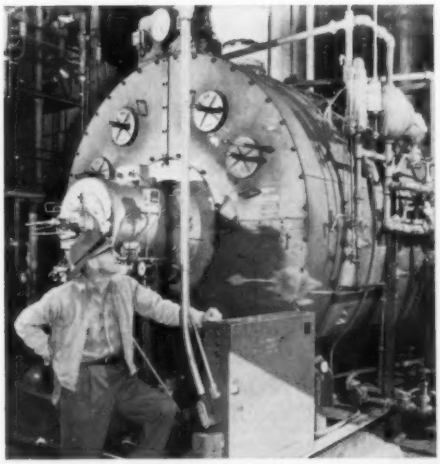
Described as the first instrument to combine in a single, portable unit four functions necessary to measure and analyze noise accurately, the 20-lb Soundscope serves to measure overall sound levels. It is also designed to operate as an analyzer.

Key to the industrial noise problem is the human factor, it is pointed out. While noise intensity and frequency can be measured, the effect on human hearing is governed by variables of age, physical condition, duration of exposure and other elements. With the Soundscope it is possible to make noise contour maps of industrial areas. Round level readings and

For more facts circle 594 on Reply Card ——→



Powermasters hold constant steam pressure against extreme load changes!



This 500 HP *Powermaster* Packaged Automatic Boiler solves two steam problems for a West Coast packing house—extra steam for processing, and more efficient off-season heating.

Four other *Powermaster* units have been installed by companies in the same area as a result of this successful installation.

This chart shows a typical 24-hour run for two 300 HP gas-fired *Powermaster* Packaged Automatic Boilers on which 100 psi steam demand varies from 3,000 to nearly 19,000 lb/hr. Note how they respond to wide and sudden load swings with virtually no variation in steam pressure. Even when the load *tripled* within a ten-minute period (see chart), only a 2 psi momentary pressure drop occurred . . . and was immediately recovered.

Uniform performance like this is a certainty for all users of *Powermasters*. Fully modulating O&S burner designs are the reason. By providing infinitely variable combustion control that instantly responds to load changes, high operating efficiency is maintained at all loads. This means fuel economy and freedom from maintenance due to incomplete combustion.

Have you checked your steam costs lately? Perhaps it will pay you to modernize with one or more *Powermaster* boilers. Write for Bulletin 1220.

Powermaster®

PACKAGED AUTOMATIC BOILERS

Sizes to 500 HP; pressures to 250 psi

ORR & SEMBOWER, INC.

Builders of Dependable Boilers Since 1885

Morgantown Road, Reading, Pa.

HOW YOU SAVE,
Getting Drier Compressed Air

● Direct saving in the cost of cooling water saves the price of the Niagara Aero After Cooler (for compressed air or gas) in less than two years.

Extra, for no cost, the drier air gives you a better operation and lower costs in the use of all air-operated tools and machines, paint spraying, sand blasting or moisture-free air cleaning. Water saving also means less expense for piping, pumping, water treatment and water disposal, or you get the use of water elsewhere in your plant where it may be badly needed.

Niagara Aero After Cooler assures all these benefits because it cools compressed air or gas below the temperature of the surrounding atmosphere; there can be no further condensation in your air lines. It condenses the moisture by passing the air thru a coil on the surface of which water is evaporated, transferring the heat to the atmosphere. It is installed outdoors, protected from freezing in winter by the Niagara Balanced Wet Bulb Control.

Write for complete information; ask for Bulletin No. 98

NIAGARA BLOWER COMPANY

Dept. PE, 405 Lexington Ave. New York 17, N. Y.

Niagara District Engineers in Principal Cities of U. S. and Canada

INDUSTRIAL COOLING HEATING • DRYING

NIAGARA

HUMIDIFYING • AIR ENGINEERING EQUIPMENT

For more facts circle 595 on Reply Card

NEW PRODUCTS

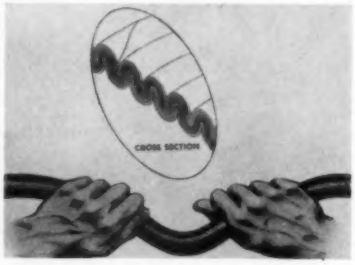
(Begins on page 136)

analyses of frequencies and intensities at different distances from noise sources can be made. With this information, measures can then be taken to eliminate noise at the source or to isolate the noise, and to protect individuals exposed.

When used as a sound level meter, the Soundscope picks up noise through its microphone which acts to transform sound into electrical energy. The reading appears on the meter calibrated in decibels. Measurement range is from 24 dec (about that of a quiet home) to 150 dec (worse than an air-raid siren). In the analyzer section of the instrument, noise is filtered into any of eight principal octave bands—noise peaks in each of these can be then measured individually. Mine Safety Appliances Co.

37—FLEXIBLE TUBING features installation advantages

Announced as possessing unusual installation advantages, Plica Tubing has been used abroad during the past ten years as electrical conduit, ideal for burying in concrete, ceilings and floors. As it can be cut with a hacksaw or knife, bent by hand to stay bent, and fits all standard



connectors, installation times are substantially reduced, it is noted. Plica has a three-ply wall and can be made in almost any combination of ferrous and non-ferrous metals, fiber, paper and other materials. Tubing is made in continuous lengths. It is described as having high wall strength, watertightness and sharp bending radii. Plica tubing, made of copper, brass, aluminum, steel, asbestos, fiber, paper and combinations of these materials, is used for lubricating, coolant and other non-corrosive liquid lines, hot and cold air ducts, mechanical protection and insulation of pipes, flexible shaft casing. Size range is ⅜ in. through 2 in. ID. Bulletin 61 gives further details. The Flexaust Co.

38—WORK PLATFORM is hydraulically operated

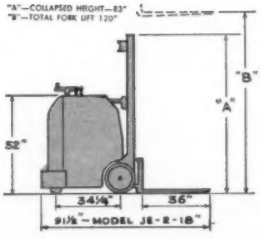
For production and maintenance work above ground level, this hydraulically-operated work platform is described as flexible and portable for both indoor and outdoor use. In its lowest position, platform is 5 ft above floor level and hydraulic power raises it to any required height

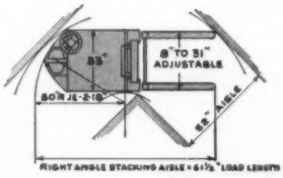
Model JEL-2 Aisle Saver. Cap. 2000 lb.

Right angle stack 61-½" plus load length.

Less aisle space... more storage space with Aisle Saver

Look at the Facts and Figures





Crescent Aisle Saver has the shortest turning radius of any heavy-duty cantilever fork truck. Extra aisle space, normally required for conventional truck operation, becomes valuable storage space.

Aisle Saver has wide load stability. Smooth, Barrett "stepless" acceleration from zero to full speed—no jerk through pickup range. Palletier sit-down center control models also available.

Let us know your storage area floor layout and specifications. Chances are we can suggest money-saving improvements. Write for Bulletin 5210.

BARRETT-CRAVENS COMPANY
618 Dundee Road, Northbrook, Ill.
Representatives in All Principal Cities
Canadian Licensee: S. A. Armstrong, Ltd., Toronto, Canada

CRESCENT
BARRETT
Barrett Handling Equipment

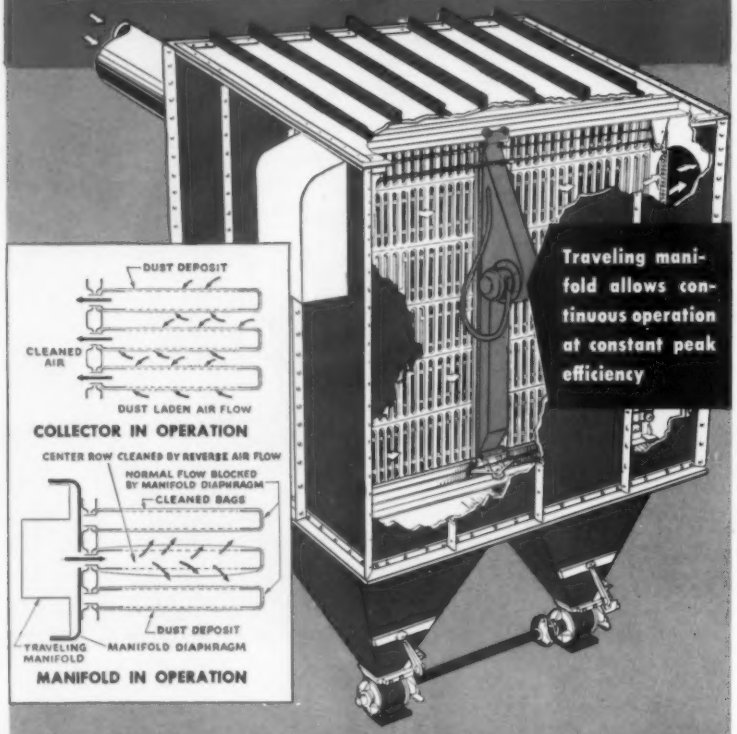
ONE MAN DOES MORE THAN 3 OR 4...WITH A BARRETT

Barrett-Cravens Company
618 Dundee Road, Northbrook, Ill.
Gentlemen:
Please send me bulletins on Crescent Aisle Saver and Palletier.

Name.....*Title*.....
Company.....
Address.....
City.....*Zone*....*State*.....

For more facts circle 596 on Reply Card

NOW! Great news about a NEW Pangborn Dust Collector that MAINTAINS CONSTANT OPERATING EFFICIENCY



New Pangborn Self-Cleaning Collector offers continuous automatic operation, constant air volume and suction, uniform air flow resistance at low cost.

TO MAINTAIN constant efficiency, the Pangborn Self-Cleaning Collector combines the proved efficiency of the cloth screen collector with continuous automatic operation.

A manifold with integral blower slowly traverses the clean air outlets of the screen frames. Covering three rows of screens at any given time, it applies a reverse air current through the center row to remove collected dust from the cloth surfaces. The result is constant high collecting efficiency and continuous operation—shutdown of the system for periodic cleaning is eliminated. Because of design simplicity and unit construction, this unique collector requires lower initial, operating and maintenance costs as well as less floor space than comparable collectors.

For full details, write for Bulletin 915 to PANGBORN CORP., 3200 Pangborn Blvd., Hagerstown, Md.

4D

Pangborn CONTROLS DUST

For more facts circle 597 on Reply Card

NEW PRODUCTS

(Begins on page 136)

up to 10 ft. Power can be supplied by ¼-hp electric motor, self-contained, battery-operated motor, or by hand pump. Double rack and pawl hold platform at working height and access to it is by telescoping ladder at one end. Constructed of steel, platform is mounted on four swivel 8 in. diam ball-bearing casters. Screw type leveling jack is provided at each corner to assure stability on level or uneven floors. Size is 33 in. by 7 ft 8 in., and rated load is 1250 lb. Platform is covered by formed, expanded steel. A handrail is provided. Ballymore Co.

39—V-S MOTOR for low speed applications

Type VEV-1-GD (double reduction) and Type VEV-1-GM (triple reduction) Varidrives are variable speed, internally-geared units, with take-off shaft and motor on the same side. They are sug-

gested for low speed applications requiring variable speed, where weight distribution and limited space are factors. Units are available through 5 hp. Both upright and horizontal assemblies are on production with dripproof, totally enclosed or explosion-proof motors. Designed for rugged duty, these Varidrives are also described as extremely compact, and as providing slow speeds and high torque without use of separate gear boxes, speed changers and other equipment. U. S. Electrical Motors Inc.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 187-188.

40—HEATERS supply fresh, warmed air to building

The FAS Unit Heater is for replacement of air exhausted in manufacturing processes and for comfort of personnel. It consists of a motor and fan, a heater section comprising alternate heating and by-pass passages, and a distributing out-

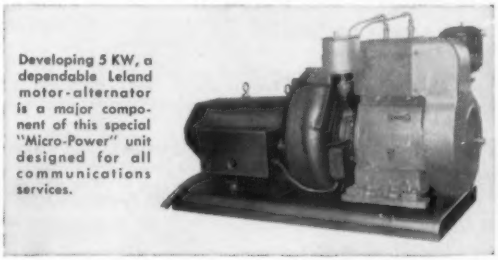
Leland generators guard the air waves

Keeping communication channels open despite failure of normal power is but one of the *many* jobs dependable Leland generators have been doing for years.

Take remotely located micro-wave relay stations that are often at the mercy of the elements. They must *unfailingly* "beam" the signal through . . . to brighten your home with TV. . . provide State Police communications . . . control many vital operations from commercial pipelines to national defense warning systems.

Rugged Leland generators, in special electric/gas-driven power units, regulate the normal power supply day in and year out . . . *take over completely and automatically* the instant normal power fails . . . provide uninterrupted service. With Leland generators in the system there's never a moment's delay.

A soundly engineered Leland unit is a safe bet to make *your* product better. Investigate Leland generators . . . and complete line of motors from ⅙ through 5 hp, soon to 20 hp, in all popular types and enclosures. Write today.



Developing 5 KW, a dependable Leland motor-alternator is a major component of this special "Micro-Power" unit designed for all communications services.

Another AMF Product

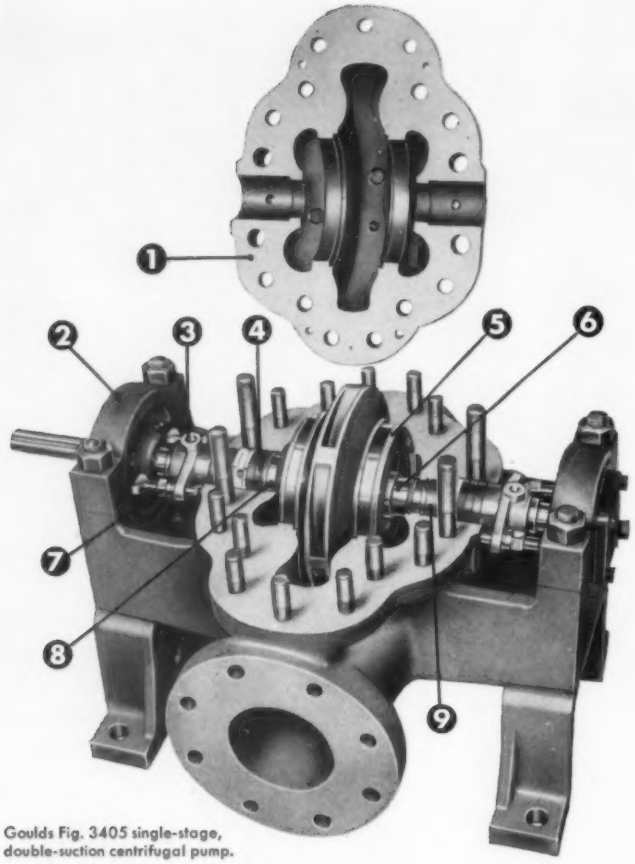
LELAND MOTORS

THE LELAND ELECTRIC COMPANY

Dayton 1, Ohio

Division of AMERICAN MACHINE & FOUNDRY COMPANY

For more facts circle 598 on Reply Card



Goulds Fig. 3405 single-stage, double-suction centrifugal pump.

You get all 9 custom features at standard pump prices

1. You can inspect, clean, and remove the entire rotating element without disturbing piping or pump and driver alignment.
2. Moisture and dust can't get through sealed bearing housings.
3. You can use quenching fluids with these cowl-type glands.
4. Stuffing box packing is die-formed.
5. Impeller rings are stainless steel.
6. Unique locking of shaft sleeves allows change of rotation in field without additional parts.
7. Gland bolts are corrosion resistant.
8. Teflon water seal rings.
9. Highly desirable stuffing box bushings. Renewable.

Only the Goulds Fig. 3405 offers all these cost-cutting features at no extra charge.

33 sizes pump 200 to 6400 GPM at heads up to 425 ft. Single-stage. Double-suction. Interchangeable parts—you can cut spares inventory by ½ or more.

Bulletin 721.6 gives performance data, specifications. Send for it.

MEMBER

Goulds PUMPS INC. Seneca Falls New York

Sales Offices: Atlanta • Boston • Chicago • Houston • New York • Philadelphia • Pittsburgh • Tulsa

For more facts circle 599 on Reply Card

NEW PRODUCTS

(Begins on page 136)

let. Air brought in through by-passes is not heated. Volume control dampers on all passages, operated by synchronized damper motors, are actuated by air-stream or room thermostat. Dampers on heating passages move toward "open" position and dampers on by-passes move toward "close" position, or vice versa, depending on temperature requirements. When outdoor temperature is lower than desired indoor temperature, the dampers on the heating passages open and those on the by-passes close to the degree needed to produce required temperature.

Steam pressure in the coils is the same as in the supply main at all times, says manufacturer, so that the coils cannot freeze. Heaters come in two types: a vertical flow type for roof or ceilings of single-story buildings or top floors of multi-story ones; and a horizontal type for windows or wall openings. Bulletin FAS-1 gives more information. L. J. Wing Mfg. Co.

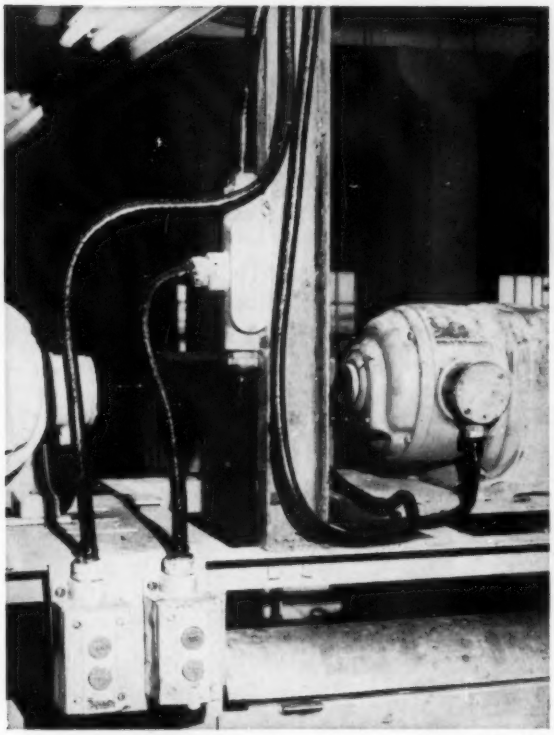
41—HIGH PRESSURE OILER is hand operated unit

According to manufacturer, this is the first hand-operated gun for contacting standard lubrication fittings. Used with

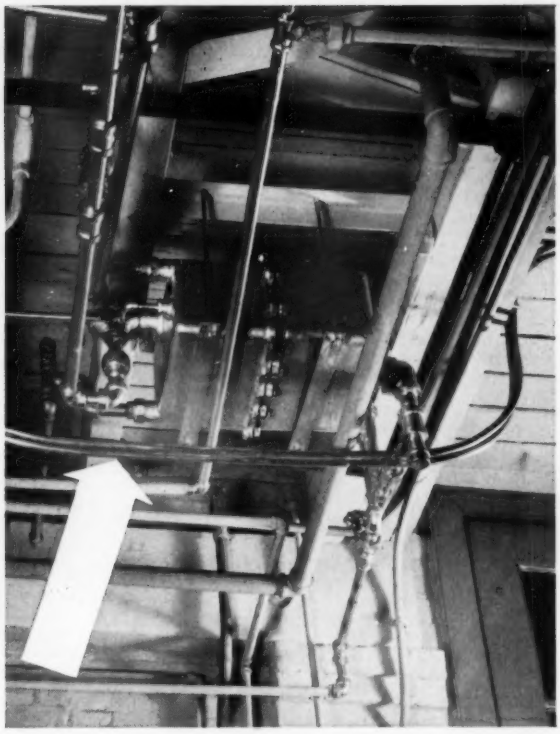
the pressure oil gun, are metal rings anodized in various colors. They are slipped over the head of each fitting to provide a color coding system for all bearings requiring oil—thus simplifying standardization. Also, these rings serve to prevent accidental use of a grease gun. Lincoln Engineering Co.

42—CONVERSION UNITS for LP gas truck carburetion

Conversion to LP gas carburetion of industrial trucks with these conversion assemblies is declared simplified to the extent that a mechanic can handle the job without prior training or special tools. The assemblies weigh only 16 lb ready for shipping and include mounting brackets pre-fitted to the frame of the model of the truck to be converted. No drilling is required. Each assembly includes a regulator, vacuum safety switch, hydrostatic relief valve, filter, quick cou-



Simple terminations—aluminum-sheathed cables are as simply terminated as conventional rubber-insulated control cables. For leads to motors and control apparatus, an aluminum sheath also provides a neat, space-saving installation. This photo shows optional Okosheath Protective Covering applied over aluminum sheath to combat an extremely corrosive atmosphere in this installation.



Easy installation—aluminum-sheathed cable is inherently rigid, yet see how easily it can be installed around pipes, heat exchangers, and other obstructions. Conduit is eliminated. Regular conduit clamps give all the support necessary for overhead installations. Note that aluminum sheath is seamless, providing a permanent moisture-proof barrier.

new aluminum-sheathed cables eliminate conduit

Many advantages are obtained from the addition of a *seamless* aluminum sheath over standard cable constructions. Virtually any Okonite cable —including rubber, plastic, varnished cambric and paper-insulated constructions—can now be obtained with an Okonite aluminum sheath.

A list of the advantages resulting from this new technique is in the next column. For further information, write to The Okonite Company, Passaic, N. J.

- **no conduit—cuts installation time and costs**
- **eliminates pulling problems and possibility of damage to conductors**
- **high tensile strength and rigidity, yet easily bent with standard tools**
- **impervious barrier to liquids and vapors**
- **mechanically strong**
- **excellent flame resistance**
- **simple terminations**
- **small diameter, light weight**

3502

OKONITE insulated cables

For more facts circle 600 on Reply Card

Why you get more service from V-Belts with CONCAVE SIDES

Fig. 1

Each sidewall of a Gates V-belt is concave (Fig. 1)—a precisely engineered curve that makes V-belts last far longer.

Fig. 1-A

HERE'S WHY: on the bend around the sheave, the concave sides of a Gates V-belt fill out and become straight (Fig. 1-A). Thus the belt makes full contact with the sides of the sheave, grips the sheave *evenly*. This even contact distributes wear uniformly across the sides of the belt.

Uniform wear lengthens belt life; keeps costs down.

MAKE THIS SIMPLE TEST

Fig. 2

Fig. 2-A

Bend a straight-sided belt (Fig. 2). The sides bulge at the bend causing uneven contact in the pulley groove (Fig. 2-A). Naturally, wear is greater at points indicated by arrows. Result: shorter belt life, increased belt costs.

To cut down-time and V-belt replacement costs, specify belts that grip evenly and wear longer. Specify Gates Vulco Rope—the V-belt with concave sides. There is a Gates distributor nearby who will quickly supply the belts you need. The Gates Rubber Co., Denver, Colorado—*World's Largest Maker of V-Belts.*

There are Gates Engineering Offices and Distributor Stocks in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

Gates

TPA 109

Gates VULCO ROPE Drives

For more facts circle 601 on Reply Card

NEW PRODUCTS

(Begins on page 136)

pling, solenoid valve, carburetor or carburetor adapter, and hoses and fittings, attached, cut to proper length and labelled. Just 20 operations are involved in making a conversion, says company, and step-by-step instructions are provided. Beam Products Mfg. Co.

43—SMALL VALVE regulates, reduces pressure

Only 5⅝ in. high and 2⅝ in. face-to-face, the Type 3381 is announced for pressure control of air, water, oil, steam and most liquids and gases. Body and trim are bronze; seat and diaphragm are

bronze or composition. Sizes are ¼ and ⅜ in., with screwed ends; a ⅛-in. size may be ordered. The Type 3381 Valve operates at inlet pressure to 400 psi at 150 F, and 250 psi at 400 F. Five spring ranges are available from 5 to 300 psi delivery pressure. The valve can be supplied with a pressure gage, mounted in either of the two outlet connections. Adjusting screws are available with square head, plastic knob or wing nut. The Type 3381 is a refinement of company's older Type 3380 Valve. Improvements announced include: elimination of cap screws for easier maintenance; and increased spring length for greater sensitivity, improved regulation. Information is in Bulletin 948. A. W. Cash Co.

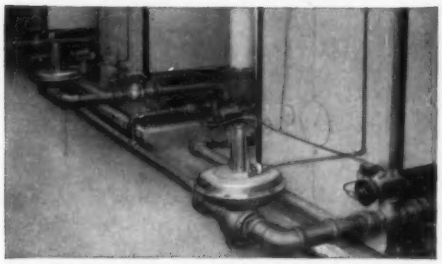
44—FLOORING resists solvents, acids, alkalis

Corocrete A is announced as a corrosion proof flooring material for use directly over concrete in processing, plating and metal-working industries. It is claimed to provide abrasion resistance five to six times greater than concrete and to be four times stronger. The material is composed of three basic ingredients; a thermosetting resin liquid, a hardening agent and an aggregate-type filler. Manufacturer says it can be used successfully in instances where many coating membranes would be destroyed by solvents, exposing the concrete base to attack by acids.

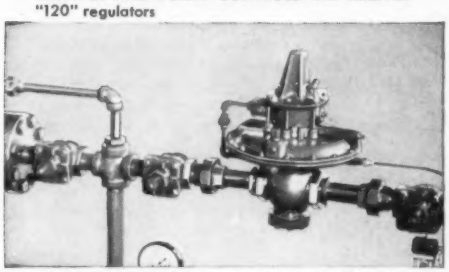
Corocrete A is mixed at the job site for immediate application. It handles like cement topping and is applied in thicknesses from ¼ to ¾ in. However,

Gas does it best!

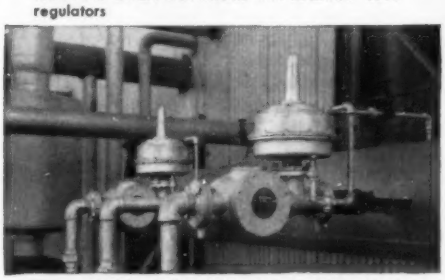
For All Industrial Heating Purposes



FURNACE AND BOILER CONTROLS with Rockwell "120" regulators



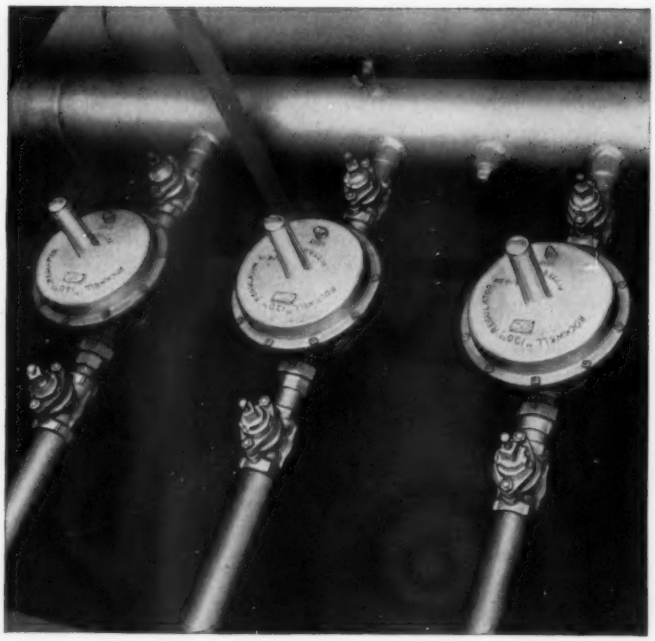
KILN AND OVEN CONTROLS with Rockwell "1001" regulators



GAS ENGINE CONTROLS with Rockwell "014" regulators

ROCKWELL *Gas Pressure* REGULATORS

A SIZE AND TYPE FOR EVERY NEED



Let Rockwell Gas Pressure Regulators **Improve Your Combustion Control**

No matter what the process when you use gas for heat or power, you need *good pressure regulation* to obtain *good combustion*. A constant, even pressure at the burners means uniform quality in your end products . . . and maximum fuel economy, too.

Rockwell makes a complete line of regulators for either high or low pressure burner control. Among them is the right type and size for any specific application. To help solve your problems in combustion control we invite you to make full use of our field engineering service. Use the handy coupon or write fully today.

Clip Coupon—Mail Today!

Use this handy coupon for literature, a quotation or free engineering assistance

Rockwell Manufacturing Company **Dept. 102H**
Pittsburgh 8, Pa.

Gentlemen:
Please send me bulletin describing Rockwell regulators for low pressure burner control ☐. For high pressure burner control ☐. Please have your field representative call ☐.

Your Name_____

Company_____

Street_____

City_____ Zone____ State_____

For more facts circle 602 on Reply Card

RIGGED FOR SAFE DIE HANDLING

To handle heavy, expensive die sets with complete safety, this manufacturer uses eight Laughlin Eye Hoist Hooks—two on each corner. The wire rope is positively secured with genuine Crosby* Clips and Laughlin Thimbles protect the rope at the lifting points.

LAUGHLIN HOOKS—drop forged and heat treated—take the risk out of this job. They're precision designed and manufactured from special high quality steel—construction that results in maximum strength and uniformity without excessive weight. Hooks are available to fit rope up to 1½" with capacities up to 20 tons!

TOUGH LAUGHLIN THIMBLES, manufactured from hot rolled steel bars, resist crushing forces. They're offered in sizes to fit all ropes from ⅛" to 2¼"!

GENUINE CROSBY CLIPS provide maximum holding power for wire rope from ⅛" to 3" in diameter. In every application where the safety of men or materials must depend upon wire rope rigging, safety engineers specify Crosby Clips! Look for the "Red U-Bolt"*—you'll see it in use everywhere—in every industry!

THE STRONGEST LINK

Wherever a chain link is replaced or connections made, a potential safety hazard exists—unless genuine Laughlin "Missing Links"* are used to do the job! This easily installed split link is essential whenever maximum safety is required. It's as strong as BBB chain! Drop forged "Missing Links" are matched to a perfect fit under tons of pressure. Your Crosby-Laughlin Distributor carries a complete range of sizes from ⅜" to 1⅞"! Insist on the *genuine* "Missing Link".

*REGISTERED TRADEMARK

Stocked and sold by leading distributors everywhere

CROSBY-LAUGHLIN *Division*

American Hoist and Derrick Company

FORT WAYNE 1, INDIANA

For more facts circle 603 on Reply Card

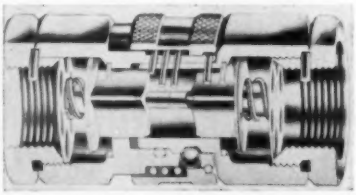
NEW PRODUCTS

(Begins on page 136)

it is reported to cure in a few hours to a dense, impermeable and non-dusting surface. It may be used for existing as well as new concrete floor surfaces and its adhesion to concrete is claimed excellent. The Ceilcote Co., Inc.

45—COUPLING withstands acids, alkali, solvents

The HK Coupling is a quick connect-disconnect type announced for acids, alkali, solvents, high pressure steam and for previously impossible fluid transfer. According to manufacturer, its use is limited only by the ability of its Teflon nipple seals and valve seals—and there



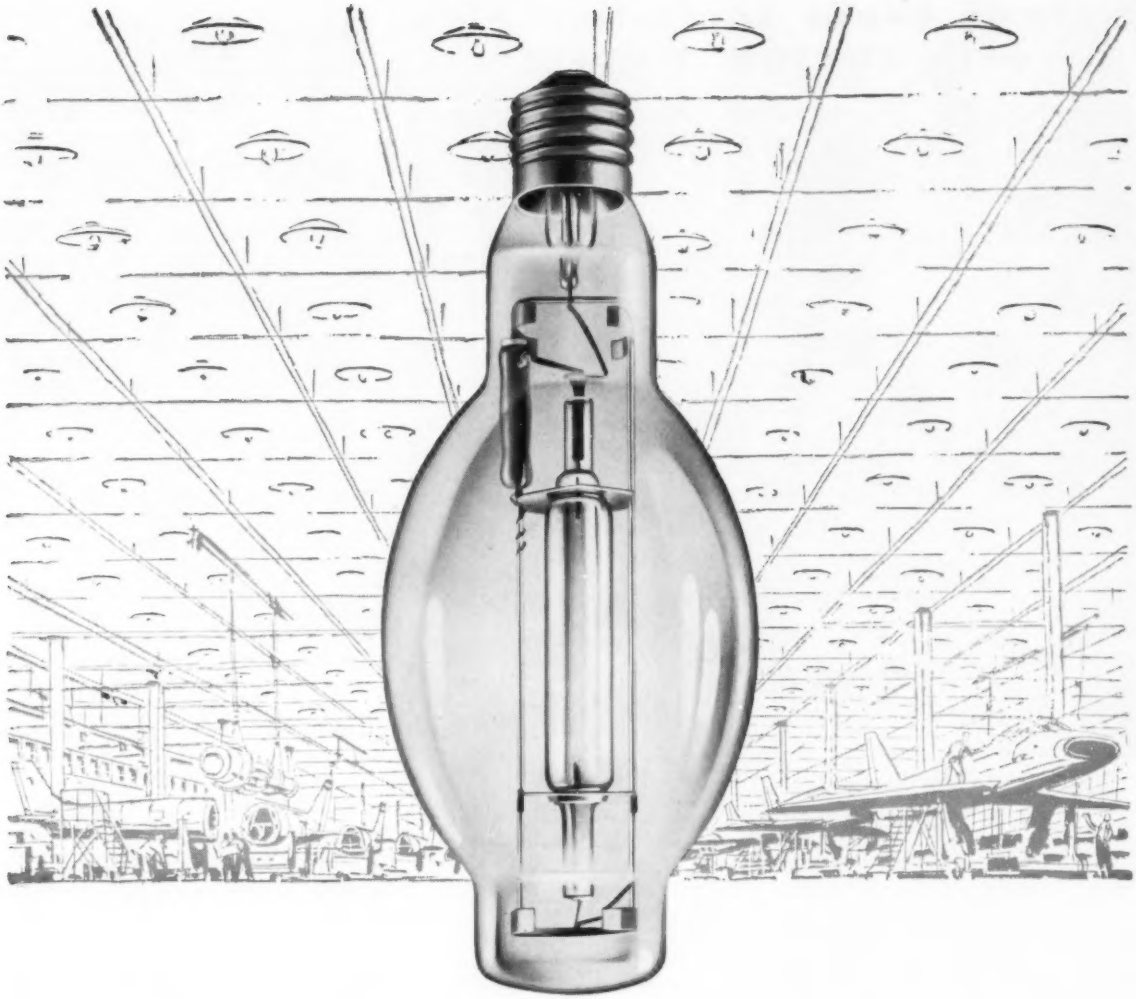
is no known solvent for Teflon. The HK is said to function perfectly through a —100 to 500 F range and can be subjected to lower and high temperatures for short periods. Made from solid bar stock, it can be furnished in 303 and 316 stainless steels, brass, aluminum, special carbon steel, or from any machinable material. Coupling is available plain (without valves) or with automatic shut-off valves in either or both ends, causing valved end of line to shut off automatically upon disconnection. When connected, coupling valves automatically open. Coupling comes in ½ through 3 in. ID pipe sizes with any type end connection. Snap-Tite, Inc.

46—RIDER-WALKIE TRUCK offers easy maintenance

Available in 4000- and 6000-lb capacities these new Worksaver Pallet Trucks feature short lost length, increased underclearance, and maximum power and stability, it is announced, as well as company's Breakaway characteristic for easy maintenance. They can be fitted with two different size battery compartments. The short battery compartment models fit a six-cell 13-plate battery (or comparative nickel alkaline model) and are only 24 in. longer than the load. The larger model takes a 25-plate battery.

The Breakaway feature makes maintenance as simple as operation of the truck, says manufacturer. Removal of two pins, one on each side of the truck, lets the whole front of the truck open away from the battery compartment, making every hydraulic and mechanical unit accessible. In addition, without disassembly of the truck, the hoist motor can be pivoted forward into the battery compartment for servicing. The Yale & Towne Mfg. Co.

(More New Products on page 214)



40 feet up...yet all the light you need at "SEE" level!

Lighting fixtures and lamps must be way up high in airplane factories, steel mills, sports arenas and similar buildings. This means that lamps must be unusually powerful for sufficient light to reach the floor area.

Among the most efficient light sources ever developed for "high bay" uses is the Sylvania Mercury Vapor Lamp. It gives brilliant blue-white light that has high illuminating power. What is more, this remarkably efficient lamp gives more light per operating dollar than practically any other lamps suitable for high bay operation.

For special applications, where color appearance is important, the Sylvania Color-Improved Mercury Vapor Lamp is particularly useful.

Because of their outstanding economy of operation and high output of usable light, Sylvania Mercury Vapor Lamps are widely used for street and highway lighting, too . . . helping to keep your taxes down, making nighttime driving safer.

If you have a lighting problem you believe Sylvania Mercury Vapor lighting will solve, phone or write your nearest Sylvania office. For technical and application data, write directly to:

SYLVANIA ELECTRIC PRODUCTS INC.
Lighting Division, Salem, Mass.
In Canada:
Sylvania Electric (Canada) Ltd.
University Tower Building, Montreal

SYLVANIA

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LIGHTING • RADIO • ELECTRONICS • TELEVISION • ATOMIC ENERGY

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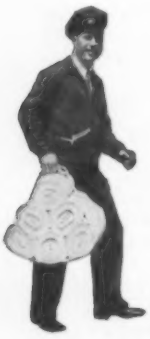
Hormel keeps sanitation high with COTTON TOWELS*

*Fairfax Towels used by Hormel Packing Company are supplied by Austin Clean Towel Service, Austin, Minn., and Ft. Dodge Clean Towel Service, Ft. Dodge, Iowa.

● At George A. Hormel & Company plants in Austin, Minn., and Fort Dodge, Ia., some 7,000 employees process and pack the meats and other food products for which Hormel is famous. Because food processing demands the highest sanitary standards of personnel and facilities, Hormel management helps maintain cleanliness by providing fresh cotton towels for both plant and office workers.

Wherever cotton towels are used, management finds washrooms are neater, inventory and storage problems are eliminated, maintenance costs and fire hazards are substantially reduced. And employees themselves appreciate the comfortable, at-home touch of cotton towels.

Let the actual experience of modern management be your guide—give the towel job to cotton in your office building, plant or institution. Write for free booklet which explains how cotton towel service will help you. The address: Fairfax, Dept. PE, 65 Worth Street, New York 13, N. Y.



Here's How Linen Supply Works . . .

You buy nothing! Your linen supply dealer furnishes everything at low service cost—cabinets, pickup and delivery, automatic supply of freshly laundered towels and uniforms. Quantities can be increased or decreased on short notice. Just look up LINEN SUPPLY or TOWEL SUPPLY in your classified telephone book.

Clean Cotton Towels . . .

Sure Sign of Good Management

Fairfax Towels WEST POINT TEXTILES

WELLINGTON SEARS CO., SELLING AGENTS, 65 WORTH STREET, NEW YORK 13

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NEW BOOKS

for the plant engineer

Structural Engineering

APPLIED STRUCTURAL DESIGN OF BUILDINGS by T. H. McKaig. Size 10¼ by 7⅝ in.; 442 pp including index; illustrated; cloth bound. Published by F. W. Dodge Corporation, 119 West 40th St., New York 18, N.Y. Price $12.50.

OFFERING SIMPLE, standardized procedures for solving structural problems, this book includes methods, short-cuts, tables and charts that the author has found valuable over a period of more than 30 years as head of an engineering firm in Buffalo. Material based on instructions developed for engineers and architects preparing to take state license examinations is also offered in this publication.

This second edition of the book contains new material which includes many recent developments in building technology. The information in this book has been tested and proved in actual practice, the book having been adopted as a standard office manual in engineering firms.

Technical Aid

PLANT OPERATORS' MANUAL. Size 10 by 6⅝ in.; 281 pp including index; illustrated; cloth bound. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N.Y. Price $5.00.

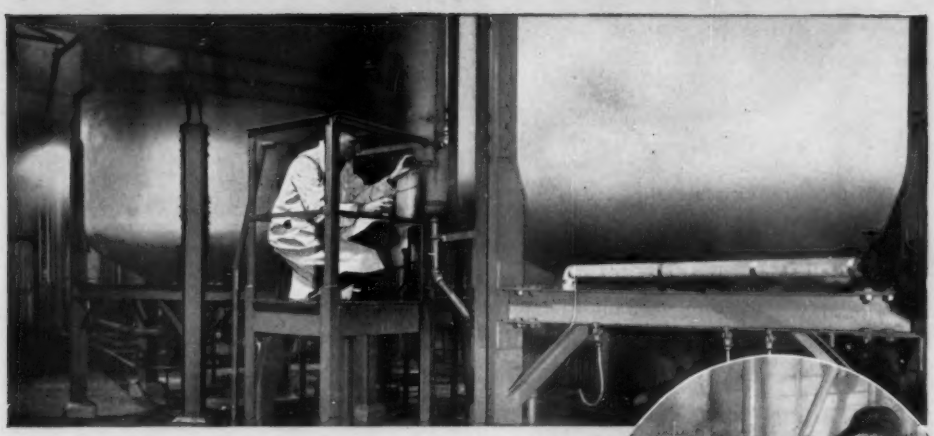
THIS HANDY MANUAL has over 1500 illustrations and is loaded with helpful details for people concerned with maintenance and operation of plant equipment. It contains material on boilers, turbines, pumps, refrigeration, packing, valves, electricity and other items.

To mention some of the specific examples of the informative content, the book contains a step-by-step procedure for charging and testing a new Freon refrigeration system. There are instructions consisting of five operations for the tuning up of a dual-fuel engine. A discussion on diesel engine bearing failures is also included.

As for boilers, some maintenance information is given in addition to material on boiler inspection covering the preparation of the unit and points to be checked. Overhaul procedure on a small turbine is followed literally as well as photographically. Space also given to some helpful piping tips for air compressor systems.

In the section on shop work, various types of common valves are discussed and illustrated. Some of the other subjects given attention in this book

EPON® RESIN does it!



Paint job still sound after four years of 100% humidity, high temperature ... in antibiotics plant

All surfaces, except stainless steel, are protected by Epon resin-based paint formulated by David E. Long Corp., New York 17, N.Y.

HERE'S HOW...

PAINT LEADS A HARD LIFE in the steamy antibiotics plant of the New York Quinine and Chemical Works. Day in and day out, paint endures live steam and high temperatures. The coating on the processing equipment is exposed to hydrochloric acid and caustic soda. All surfaces take frequent hosing and scrubbing.

No ordinary paint would stand up to such usage. Epon resin-based coatings were applied in the Spring of 1952 throughout the plant . . . on walls and ceilings, on all metal piping except stainless steel, on all processing equipment. This Epon resin ester paint, dried at room temperatures, has given complete resistance to corrosion by chemicals and moisture, excellent adhesion to metals, plaster and concrete, and because of its glossy finish has reduced dust settling.

Four years after it was brushed on, the Epon resin paint looks sound and new. And the Chief Engineer has no intention of repainting this year!

If you have a paint maintenance problem . . . where ordinary paints just can't take it—ask your paint supplier for Epon resin-based paint. You'll find that it is unsurpassed as an all-purpose industrial coating! Call on Shell Chemical sales offices for names of suppliers. Write for the full Epon resin coatings story, "Planning to Paint a Pyramid?"

Epon resins are the epoxy polymers made exclusively by Shell Chemical Corporation.

SHELL

SHELL CHEMICAL CORPORATION

CHEMICAL SALES DIVISION

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Chemical Division, Shell Oil Company of Canada, Limited
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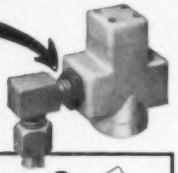
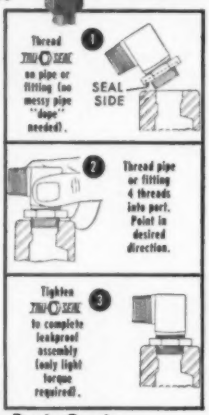
TRU-O-SEAL
TEFLON SEAL
STOPS PIPE THREAD LEAKS instantly!
PAT. PENDING



Prevents future leaks!

TRU-O-SEAL does away with messy pipe "dope" compounds, eliminates damage caused by overtightening of conventional leaky joints, and is immune to ALL known hydraulic fluids and to steam, air, water, solvents, and practically all gases and chemicals. It withstands temperatures from —100° F. to plus 500° F., saves cost and labor of special or welded fittings, and has been fully field tested and proven by leading manufacturers. Comes in ⅛" to 2½" pipe thread sizes.


1
Thread TRU-O-SEAL on pipe or fitting (no messy pipe "dope" needed).
SEAL SIDE
2
Thread pipe or fitting 4 threads into port. Point in desired direction.
3
Tighten TRU-O-SEAL to complete leakproof assembly (only light torque required).

Write for data and prices

TRU-O-SEAL DIVISION
Flick Reedy Corporation
2011 N. Hawthorne Ave., Melrose Park, Ill.
"Miller Fluid Power" is also a Div. of Flick-Reedy Corp.

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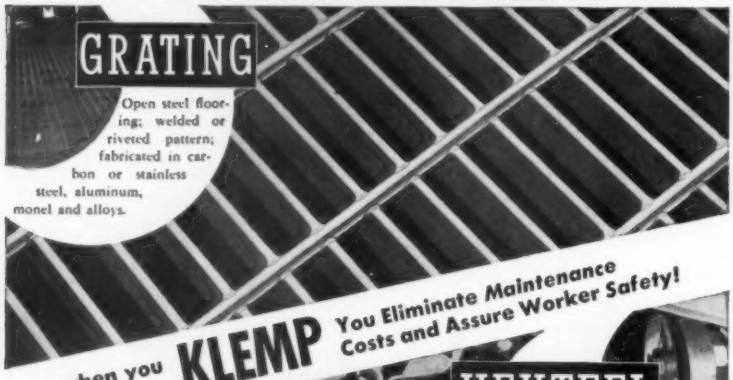
GRATING
Open steel flooring; welded or riveted pattern; fabricated in carbon or stainless steel, aluminum, monel and alloys.
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A steel floor armor designed to prolong the life of floors 5 times! Installed in concrete or mastic on new or existing concrete or wood floors.
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Kindly send me a copy of your "Data and Specification Manual."
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division are as follows: lock nut selection, coupling alignment, piston ring fitting, and practical drilling hints.

Labor Relations

SUCCESSFUL HANDLING OF LABOR GRIEVANCES. Size 9¼ by 6⅛ in.; 307 pp including index; cloth bound. Published by Central Book Co., 261 Broadway, New York 7, N.Y. Price $5.95.

PLANT ENGINEERS, among their responsibilities, include one that is quite important, namely molding workers under them into an efficient force with the least possible amount of friction. However, even under the best conditions, there is bound to be some worker unrest generated that results in what is known as a grievance. This may lead to arbitration in which the plant engineer becomes involved. In such a case, a little know-how on the subject of labor grievances may serve him well.

Here is a book that can be of help to plant engineers and others. It treats the subject of grievances extensively, beginning with the general objectives of grievance procedures and leading into a number of definitions of the expression "labor grievances". The second main part of the book is devoted to grievance machinery in labor agreements. The third principal section covers achievement of control and proper grievance handling.

Lubrication

THEORY AND PRACTICE of Lubrication for Engineers by Dudley D. Fuller. Size 9¼ by 6⅛ in.; 432 pp including index; illustrated; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. Price $10.50.

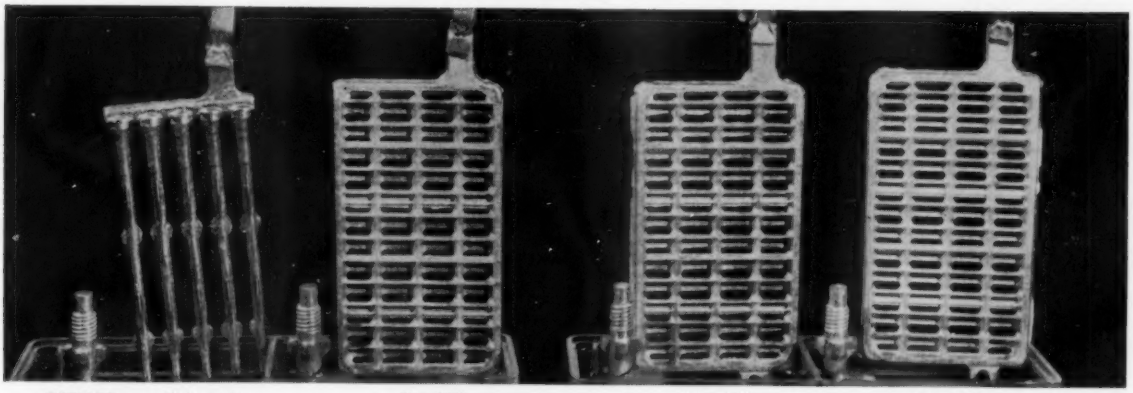
THIS BOOK constitutes a balanced treatment of theory and practice in lubrication. The author not only presents lubrication fundamentals but he applies principles to a wide range of lubrication problems.

In several sections of the book, attention has been given to the design and performance of journal bearings. Some typical types of industrial bearings are covered in another section. This is followed by material on air-lubricated bearings. Various bearing materials are also discussed separately.

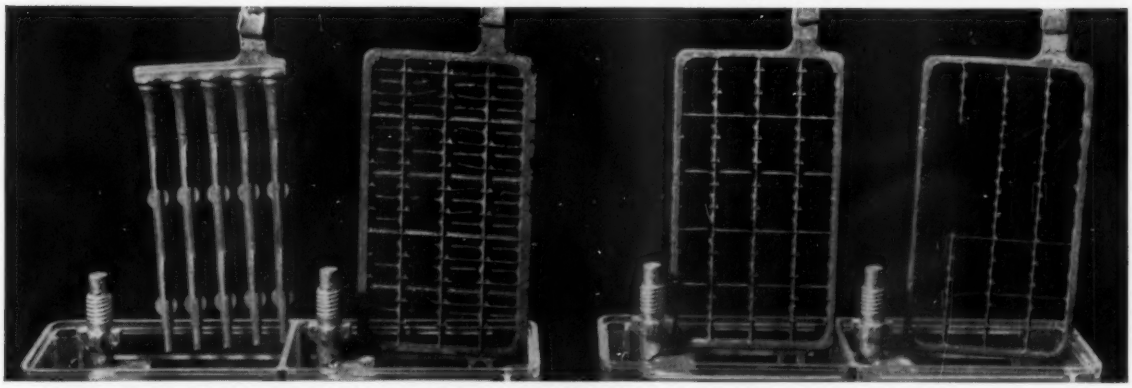
The treatment on hydrostatic lubrication is rather lengthy and is supported by numerous illustrations including drawings. There is some discussion given to the general design features of hydrostatic lifts. This book also offers a complete presentation of the hydrodynamic theory with emphasis on the engineer's point of view. Simplified mathematics have in spots replaced differential equations.

EXIDE-IRONCLAD BATTERIES

For electric industrial truck operation



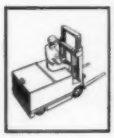
BEFORE: Silvium alloy — Alloy "A" — Alloy "B" — Alloy "C"



AFTER: Note how the Silvium grid resisted corrosion. Compare it with the other alloys.

Corrosion resistant SILVIUM prolongs battery life

BATTERY FOR ELECTRIC INDUSTRIAL TRUCK, Model TH. Fits snugly into space provided on truck. Has tubular construction of positive plates, Silvium grids, "Permanized" negative plates, extra heavy connectors and all other Exide-Ironclad advantages that mean power to spare in heavy duty applications. Write for Bulletin 5161.



Reaching down deep into every Exide-Ironclad Battery are the fingers of Silvium alloy metal which form the grids of the famous Exide-Ironclad positive plates.

Silvium is a special alloy developed by Exide to resist corrosion and thus prolong battery life. For proof, Exide research engineers compared the performance of an Ironclad Silvium grid side by side with ordinary grids of other lead alloys. As the photographs above show, only Silvium came through the test without damaging corrosion—undiminished in size, unimpaired in strength. The other grids showed from moderate to severe corrosion.

Tests have proved that Silvium is not only more resistant to corrosion, but also a better conductor of electricity. Hence it both prolongs battery life and —because there's less internal battery resistance—more readily permits heavy drafts of power.

This special material is only one of the many exclusive features which have made Exide-Ironclad Batteries world famous for high capacity and long life. When you order batteries for heavy duty applications, or the equipment requiring such batteries, be sure to specify Exide-Ironclad. Write for detailed bulletin. Exide Industrial Division, The Electric Storage Battery Company, Phila. 2, Pa.

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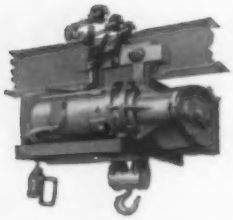
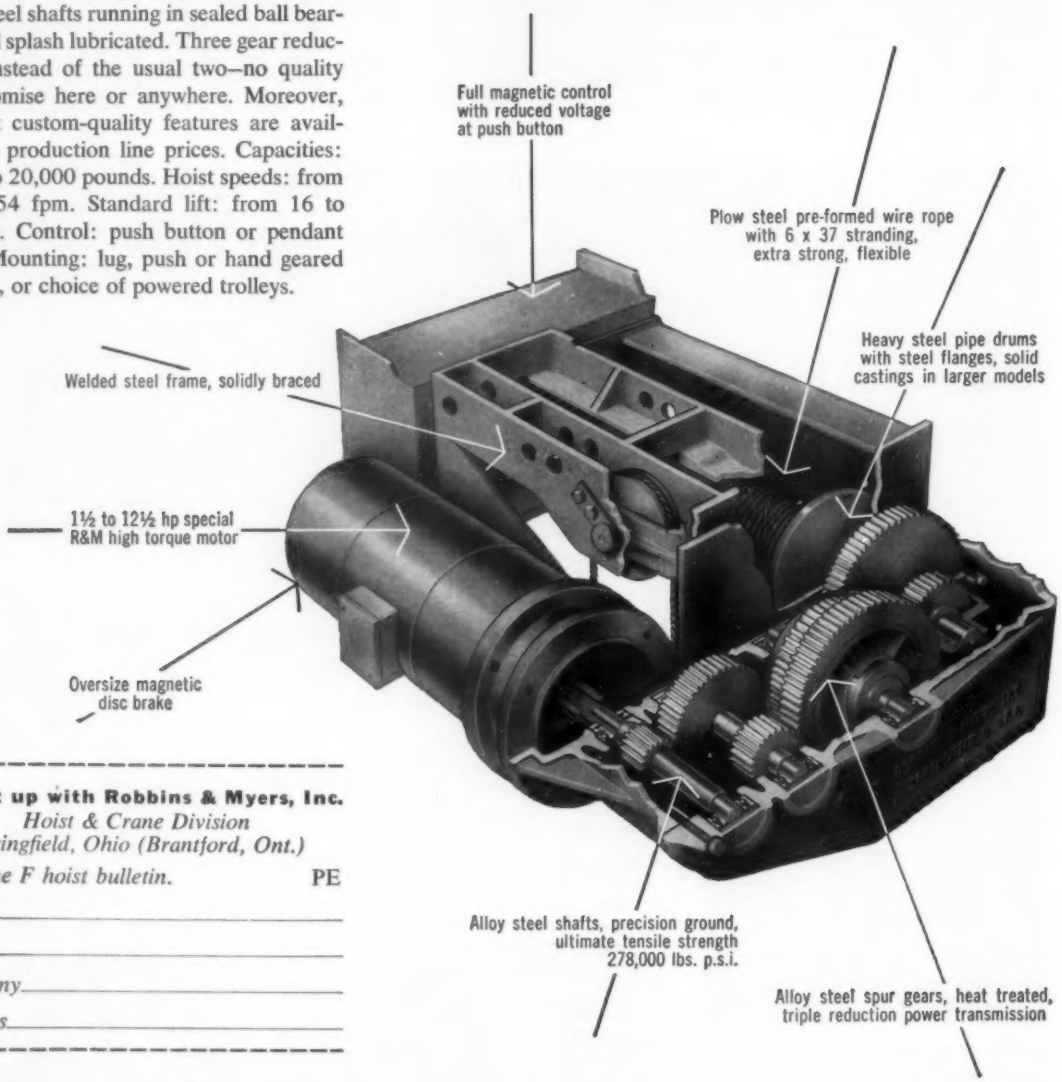
Exide®



R&M F hoists cut down the cost of lifting but the F hoists save still more money. Dollars usually spent on maintenance become dollars earned because of the extra stamina built into each component. Look at the gearing—here are precision cut alloy steel spur gears, wide faced and heat treated for durability. They're mounted on alloy steel shafts running in sealed ball bearings, all splash lubricated. Three gear reductions instead of the usual two—no quality compromise here or anywhere. Moreover, F hoist custom-quality features are available at production line prices. Capacities: 1000 to 20,000 pounds. Hoist speeds: from 10 to 54 fpm. Standard lift: from 16 to 40 feet. Control: push button or pendant rope. Mounting: lug, push or hand geared trolleys, or choice of powered trolleys.

choose a hoist with extra stamina


Full magnetic control with reduced voltage at push button
Plow steel pre-formed wire rope with 6 x 37 stranding, extra strong, flexible
Heavy steel pipe drums with steel flanges, solid castings in larger models
Welded steel frame, solidly braced
1½ to 12½ hp special R&M high torque motor
Oversize magnetic disc brake
Alloy steel shafts, precision ground, ultimate tensile strength 278,000 lbs. p.s.i.
Alloy steel spur gears, heat treated, triple reduction power transmission

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take it up with Robbins & Myers, Inc.
Hoist & Crane Division
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Send me F hoist bulletin. PE

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*Company*_____

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ROBBINS & MYERS **hoists • cranes • winches**

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Safety Practices in Arc Welding

(Continued from page 104)

may suffer blisters more readily from handling hot weldments. The two basic styles may be varied in several ways. Either style may have a winged thumb or an inset thumb. The inset thumb provides a seam to contend with. Either style may be lined or unlined. If lined, there may be a half lining or full lining.

Hazards to health in arc welding are comparatively few. Gases such as carbon monoxide, carbon dioxide, oxides of nitrogen, ozone and under certain circumstances fluorine, silicon fluoride and hydrofluoric acid may be

"Be careful of that switch, Joe. I think it's . . . yep, it's out of order"

produced in any particular operation. There is little evidence that any of these are present to a harmful extent, unless in very confined quarters with little or no ventilation.

Chemical compounds which may be present as finely divided particles are: iron oxide, manganese dioxide, silica, chromium oxide, calcium fluoride and sodium fluoride.

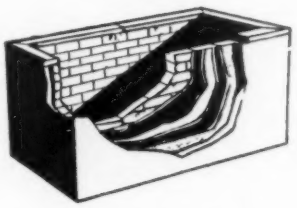
Lead oxide may be encountered when lead-containing paint is burned and should definitely be listed as a hazard. Extremely toxic fumes are evolved from the presence of cadmium at temperatures below those of the arc, and materials containing or plated with cadmium should be treated with extreme caution.

Zinc fumes have been known to give some individuals an illness known as "zinc chills" or metal fume fever. This experience is most unpleasant but is generally not serious and rarely lasts more than 24 hours. Some men may even develop an immunity after an attack of "zinc chills." Welders who do not should not be placed on such work.

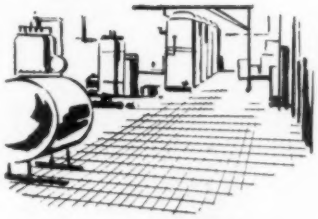
Other fumes may be encountered from time to time due to heating various residues, sludges, etc., which might

the most enduring way

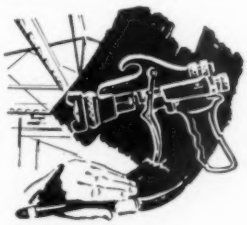
to ... **STOP CORROSION**



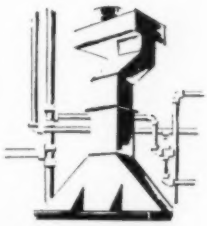
with ATLAS TANK LININGS for steel or concrete tanks. A complete corrosion-proof covering system from primer to protective brick sheathing.



with ATLAS CORROSION PROOF CEMENTS for the most severe conditions. Protection against acids, alkalies, salts, solvents and other corrosives.



with ATLAS PROTECTIVE COATINGS for almost every purpose. A complete line to assure the proper protective coating for the job.



with ATLAS RIGID PLASTIC STRUCTURES for tanks, fume exhaust duct work and complete pipe systems. Fabricated of highest quality corrosion proof plastics.

Specify **ATLAS**

Tear out this ad and check the block where corrosion protection is most needed in your plant. You will receive a complete bulletin giving all technical information.

☐ **CEMENTS**
☐ **LININGS**
☐ **PROTECTIVE COATINGS**
☐ **RIGID PLASTIC STRUCTURES**

ATLAS MINERAL PRODUCTS COMPANY
MERTZTOWN, PENNSYLVANIA

TECHNICAL REPRESENTATIVES THROUGHOUT THE UNITED STATES

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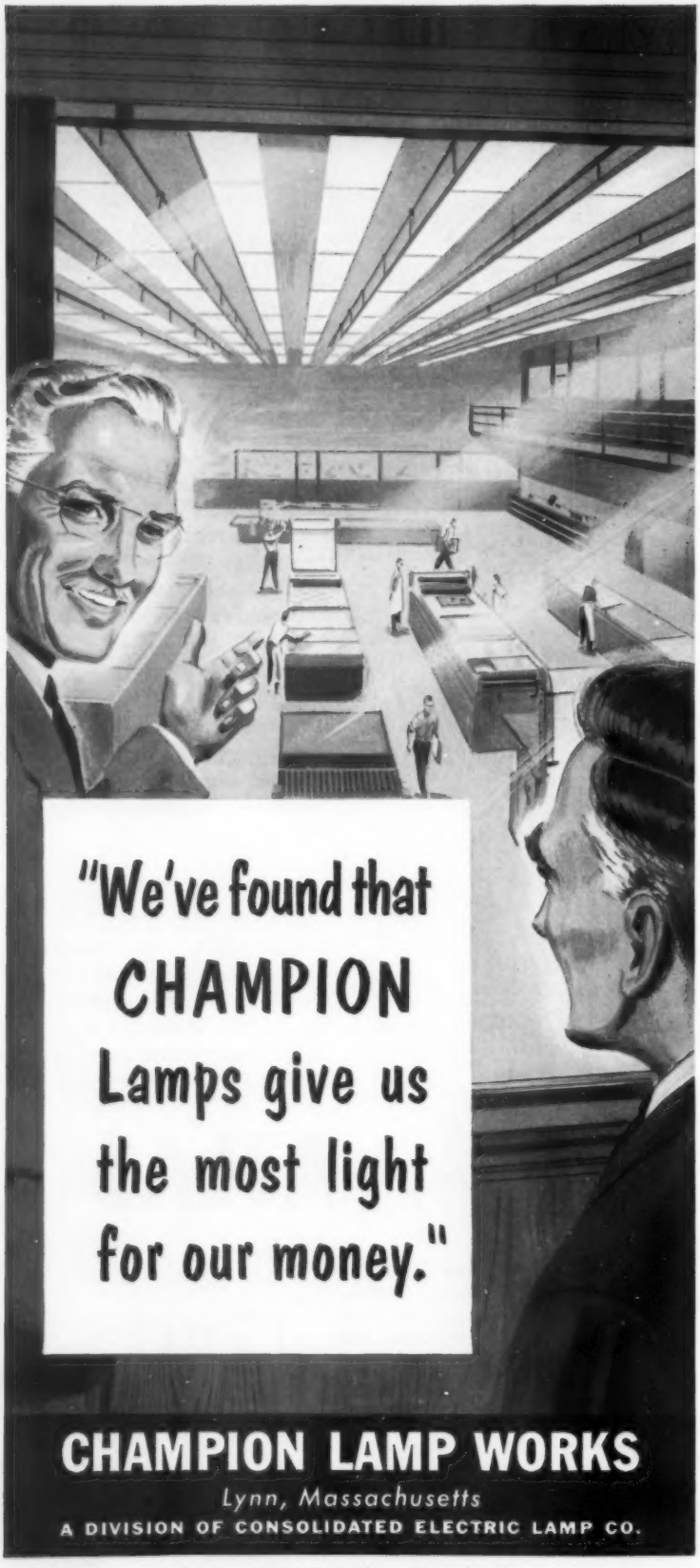


For more facts circle 612 on Reply Card

be present on the material. There will be little danger to the welder's health if adequate ventilation is provided. This might be general ventilation like a very high ceiling with adequate exhaust or it might be local exhaust—a suction device to draw away harmful gases or dust.

There are a few general precautions which suggest themselves as matters of comon sense. In an area containing a number of welding operations, it would be common sense to set up screens to protect from the flashing arc. In particularly dusty areas, respirators are indicated.

Fires at or near welding operations are nearly always due to carelessness. Being preventable, they should be eliminated. Actually, most fires occur during the use of portable equipment. Fires rarely occur where welding equipment is set up for production work. Exercise of a little common sense will prevent welding near rooms containing flammable vapors, liquids, lints or dust or near combustible material. This includes wooden floors, cracks, and holes in walls, etc.

A little knowledge of the problems peculiar to welding, plus a large amount of common sense will go a long way towards safety in arc welding.

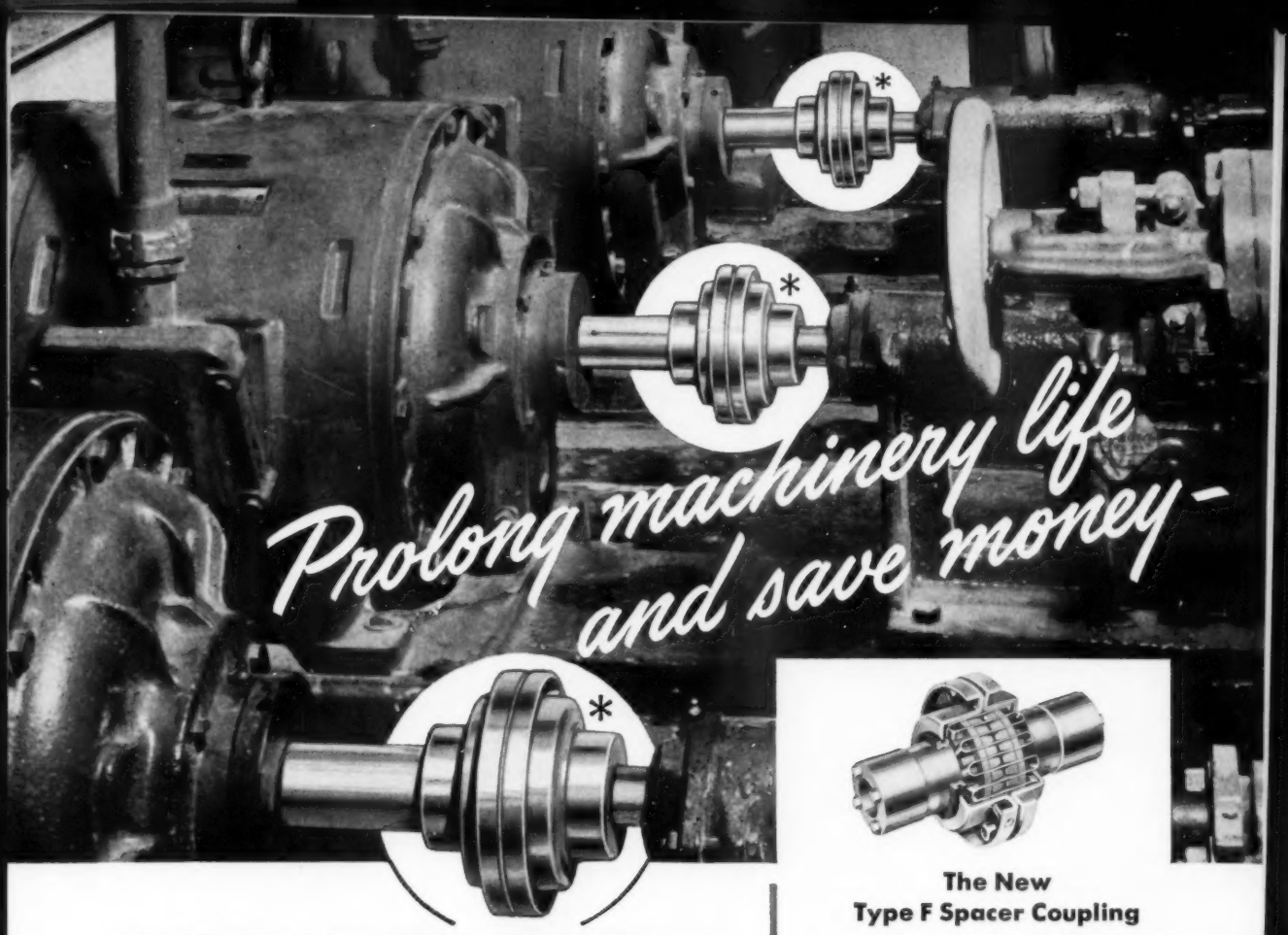
Grounding Transformers

(Continued from page 99)

a specific example of the application. Figure 6 shows the co-ordination of the direct acting trips for a feeder ground fault, and Fig. 9 shows co-ordination for a three-phase fault.

This method is applicable on the conventional cascaded system where it may be desirable to isolate a fault in the grounding transformer without shutting down the system. However, an inherent characteristic of this system is that the main secondary breaker will also trip for faults at or above the setting of the instantaneous trip device on the main secondary breaker. To comply with the rules for cascading, the instantaneous trip on the main secondary breaker must be set at 53.4 per cent of the interrupting rating of the feeder breakers. Selectivity comparable to a cascade system may be obtained with this method at a cost lower than that of a completely selective system. To obtain complete selectivity, current transformers, relays, and shunt trips on the low voltage breakers are required.

The method of connection is the same as for medium voltage systems as illustrated in Fig. 3. This method has the disadvantage of relatively high cost. It can be justified only in cases where complete selectivity is required.



with FALK Steelflex Couplings

Ever since the first Falk Steelflex Coupling was designed and built, we have firmly held to these beliefs:

1. A coupling, to give fullest value, must do more than merely *connect* driving and driven machinery—it must *protect* the machinery and prolong its life.

2. A coupling, to be truly flexible, must overcome the effects of shock and vibration, as well as shaft misalignment.

Proof of the soundness of those beliefs is furnished by the record. More than one million Falk Steelflex Couplings have been used on every conceivable type of industrial application . . . giving trouble-free service, providing maximum protection to connected machinery.

* A single basic type—the famous Type F—fills 90% of all industrial application needs. It is versatile, efficient and economical. And—it is always available from factory, field or distributor stocks, in a wide range of sizes.

Write to Department 247 for engineering bulletin, including selection and dimension tables.

THE FALK CORPORATION, MILWAUKEE, WISCONSIN

MANUFACTURERS OF:

- Motoreducers
- Speed Reducers
- Flexible Couplings
- Shaft Mounted Drives
- High Speed Drives
- Special Gear Drives
- Single Helical Gears
- Herringbone Gears
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- Steel Castings
- Weldments
- Contract Machining

FALK

...a good name in industry

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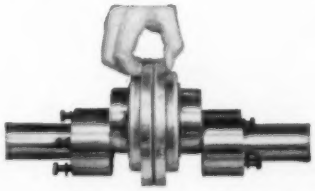
The New Type F Spacer Coupling

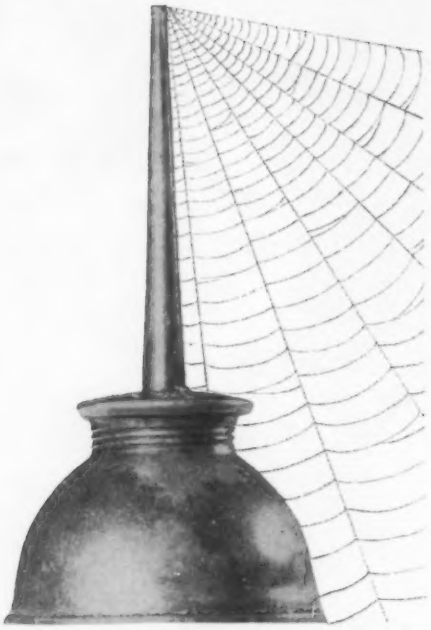
Here is a Steelflex coupling specially designed to permit fast, easy installation and removal in horizontal and vertical applications where it is impracticable to move the connected units—or where a space-gap (up to 12 in.) is necessary.

Like all Steelflex couplings, the Type F Spacer gives long, trouble-free service and maximum 3-way protection for connected machinery: it provides torsional resilience to reduce shock and vibration; it accommodates parallel or angular shaft misalignment; it allows free (or limited) end float.

An outstanding feature of the Steelflex Spacer is that it can be installed or removed in one piece (see photo below); no dismantling or servicing of the coupling is required. Pump assemblies can be disconnected and removed without disassembling the coupling, without exposing working parts.



The Steelflex Spacer coupling is prelubricated at the Factory and can be installed, or removed and reinstalled, without disturbing the lubricant—a highly desirable feature.



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by Whitney Self-Lubricating Roller Chain

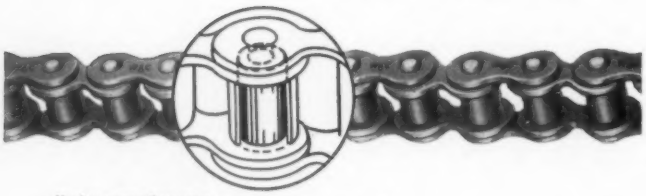
Sintered bushings eliminate external oiling, open new drive design opportunities in agricultural and packaging machinery where conventional lubricating is impractical or costly. In tobacco, textile or food processing, Whitney Self-Lubricating Chain eliminates risk of oil contamination, reduces costly spoilage. This new and exclusive Whitney Chain assures —

High strength, positive drive
Long, economical service
Operational benefits to your customers
Complete interchangeability with A.S.A. Chains

Write for folder on Whitney's Self-Lubricating Chain giving full details with sizes.

WHITNEY ENGINEERING SERVICE

Consult your nearby Whitney Field Office on any drive problem. Whitney's 60-year experience in producing precision finished steel chain can help you best determine your chain requirements



Under operating pressures bushing heats and releases stored lubricant which is reabsorbed by bushing when chain is idle. Cycle continues for life of chain.

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Planning Radioactivity Lab

(Continued from page 86)

to "hot" laboratories there would be space needed for a monitoring station which would be at least one hand and foot counter, and with auxiliary equipment as "levels" rose in any particular area. A hand and foot counter is a radiation sensitive electronic device which determines the "level" of contamination on hands and shoes. It is about 2 ft square and 5 ft high.

Space for shielding of experiments and equipment must be considered for all radioactivity laboratories depending on "level" of work contemplated. In addition, consideration should be given to extra aisle space to minimize chances of accidents and "spills."

Special locker and washup facilities are sometimes required between "hot" areas and other spaces to permit any required cleanup before allowing clothes to leave the laboratory. This would mean a locker for street clothes on the "cold" side of a washup and shower room with lockers for work clothes on the "hot" side.

Counting rooms are generally a must in all types of radioactivity laboratories. (3, 26.) They are shielded (radiation and micro-wave) spaces where sensitive electronic instrumentation counts and records the number of disintegrations in various small samples (usually shielded also). Since this is where the final results of a radioactive experiment are usually determined the maximum of accuracy is required and much care must be used to properly locate and protect these rooms from any influence that will falsify the count; such as external radiation, voltage fluctuations or micro-wave interference with electronic gear.

Isotope storage of some magnitude must also be provided for all laboratories except those primarily using machine generated radiation. The storage facilities can be a vault of concrete with horizontal holes having steel or lead doors or heavy plugs; a shielded room with "pots" or "pigs" of concrete or lead; or vertical pipes into the ground within a shielded enclosure. The storage should be biologically safe and also such as not to fog, film or interfere with delicate laboratory measurements. This storage is usually near or in a "hot" laboratory or special isotope dilution suite to permit manipulation and preparation of quantities and strengths of radioactive materials as required by specific experiments.

Provision should also be made in the exhaust system of most laboratories for connection of the exhaust of "dry boxes" (completely enclosed

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IMPROVED PRODUCTION OF MACHINE OPERATORS
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Work receiving box in same stand conserves floor area.

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Those who have seen it in action agree—there's nothing like it for cutting production time, reducing handling hours, lowering operator fatigue, conserving floor space—for saving you time and dollars. But get the entire story. See your Powell representative. He has full literature and working models. Or write direct to Powell for your copy of Powell FLOW-MATION* Systems, a specially prepared pamphlet that explains the entire system.

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glove boxes) in one or more locations.

It is evident that radioactive materials complicate most aspects of laboratory planning, engineering, and design with consequent effects on the costs of these types of facilities. A very general range of square foot cost figures, with "tracer-level" laboratories on the lower side and "hot" laboratories on the higher side, (31), is as follows: biology and medical, $35 to $60; chemistry, $45 to $75; physics, $25 to $75; engineering, $60 to $90. These figures include the usual adjacent spaces such as offices, corridors, and general facilities.

This presentation outlines only the basic problems and give a general indication of method of solution. More detailed data on general and specific problems can be obtained from the various references in the bibliography.

Water Cooled Compressors

(Continued from page 108)

dations. The multi-cylinder, multi-service arrangements possible with this type compressor offers an extremely flexible unit for any industry.

Proper compressor foundations are very important to the heavy duty, reciprocating compressor. Take at least four core samples from the proposed location to evaluate the soil makeup, for clays, sand, alluvials, and mixtures of these soils offer widely varying load capacities.

Consult a good foundation engineer to help you lay out your mats, and ask the compressor manufacturer to supply shaking forces of the machine. As a guide, static loading should be no more than one quarter of the soil bearing pressure.

When pouring the mat, allow for a gap between it and the adjacent floor. Filling the gap with tar, asphalt, or some other vibration damping medium will insulate the rest of the building.

Auxiliary Equipment

Any compressor installation is limited in its usefulness when the supporting components are inadequate, or missing altogether. Air receivers, aftercoolers, separators, filters, and safety devices are not luxury items, but necessities.

Air receivers are the warehouses of the compressed air system. By storing air under pressure, the system is better equipped to cope with peak load periods. Proper sizing of these tanks may save you the price of an extra compressor, or oversizing in the base unit. Before you buy that extra compressor to help out during heavy load periods, make a rough check on your storage capacity with the following formula. Maybe all you need is another receiver.

$$T = [V(P_1 - P_2)] \div CP_0$$

- T = Time in minutes receiver will supply air from upper to lower pressure limits.
- V = Volume of receiver, in cubic feet.
- P_0 = Atmospheric pressure, psi absolute.
- P_1 = Maximum tank pressure (max. compressor discharge) psi absolute.
- P_2 = Minimum tank pressure (min. required to operate tool) psi absolute.
- C = Free air required, in cfm.

Aftercoolers, in decreasing discharge air temperatures, reduce the moisture holding capacity of the air. The condensate entrained in the stream must be removed by a separator downstream of the aftercooler, of course; but the water removed here will save you later problems arising from deposition of water in the system proper. Too, the lower the discharge air temperature, the greater the weight of air that can be packed into a given receiver and system.

Air intake filters are highly desirable for the system. Moisture and dirt-laden air from the average industrial

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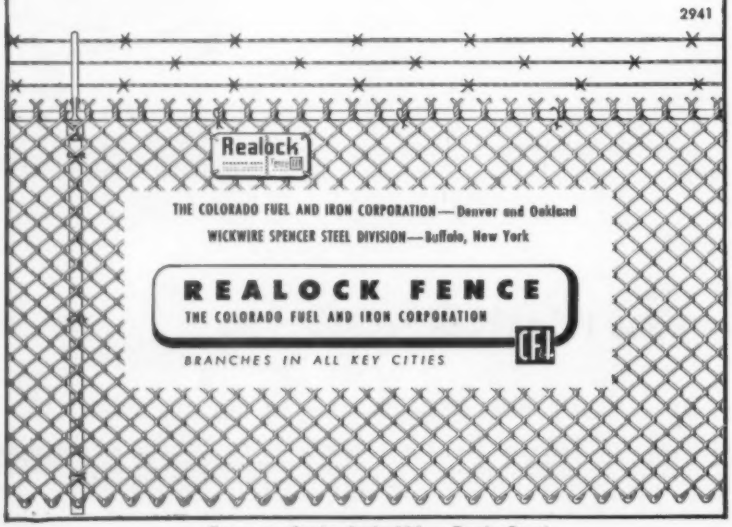

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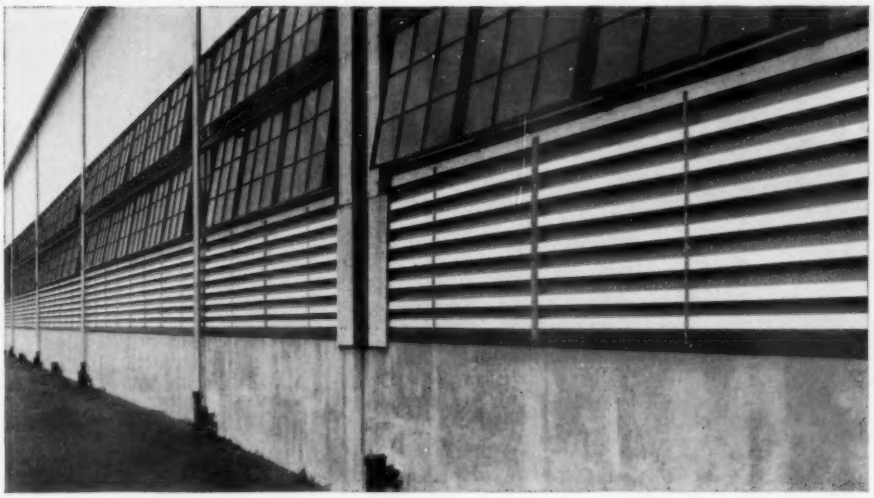
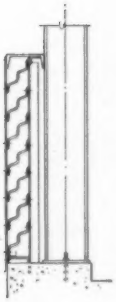


WITH CORRUGATED ASBESTONE

Walls that breathe with louvers of Gold Bond Corrugated Asbestone



Sidewalls in this Alabama plant ventilate and protect at the same time. Louvers made of fireproof Gold Bond Corrugated ASBESTONE "400" form the lower sections of these unusual sidewalls and add to the general appearance of the plant, too. The diagram at the left illustrates the method used in this system. The upper walls are sided with Corrugated "400" in the traditional straight line method. Rock-like ASBESTONE needs no upkeep . . . resists weather and corrosion permanently.

How many uses can *you* think of for Gold Bond Corrugated Asbestone? Wherever you use it, you're getting lasting protection and good looks. Write for details on this versatile product. Address Dept. **PE-86,** National Gypsum Company, P. O. 5257-B, New Orleans 15, La.

Gold Bond Technical Bulletin No. 2032, and Booklet No. 2273 gives full specifications and uses of Gold Bond CORRUGATED ASBESTONE Products.

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MATHEWS

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location is often of heavy enough concentration to decrease piston ring and packing life by years. Change or clean the filtering media as often as the location indicates. A dirty filter is little better than no filter, and sometimes worse because of increased pressure drop.

No compressor system should be without safety valves. On the intercoolers, and between the compressor and shutoff valves, the safety valve is insurance against dangerous overloads.

High temperature detection and shutdown devices in the discharge air line will warn you of leaky valves, insufficient lubrication, or not enough cooling water. Similar mechanical "watchmen" will protect the compressor against excessive bearing heat, and low lube oil pressure.

Thermometers and pressure gages indicate the "pulse" of the compressor. Use them generously, but discriminately, in air and water lines.

Select your compressor for thrift, but don't save pennies that will cost you dollars.

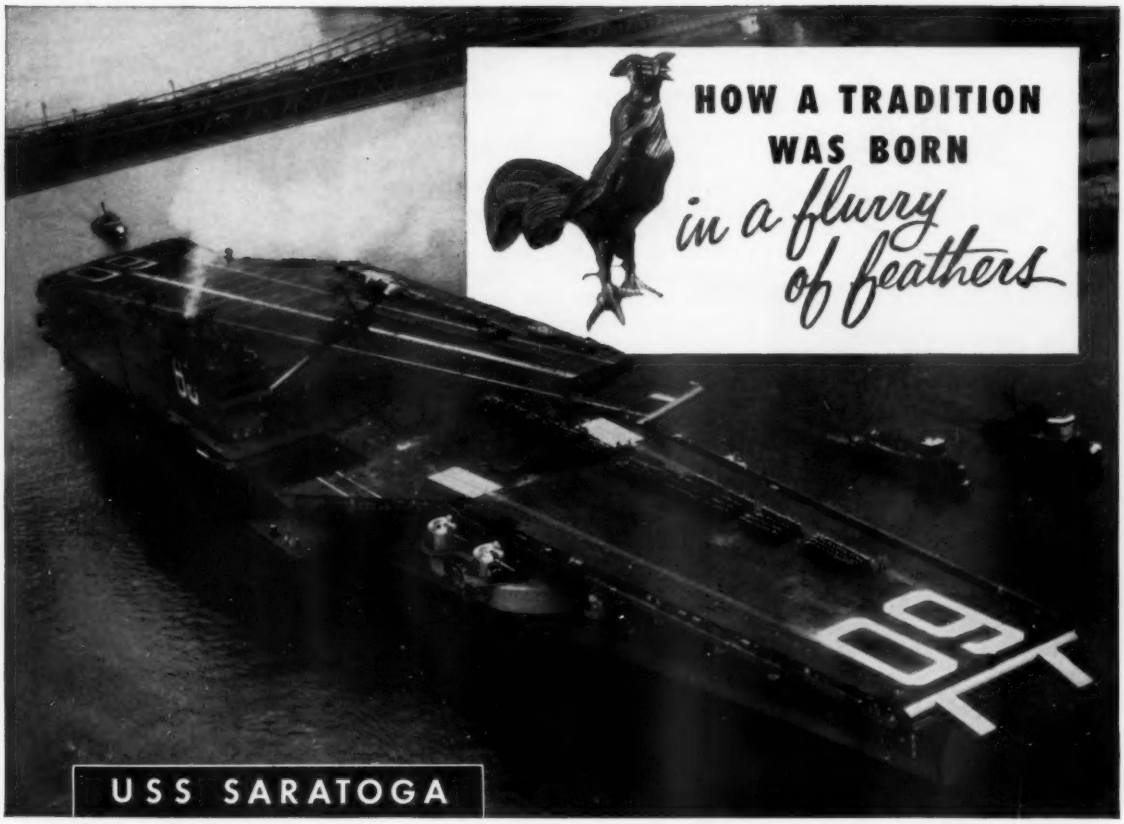
Selection of Proper Fluids

(Continued from page 120)

fluids are Type 2 (a) Phosphate Base, Type 2 (b) Chlorinated Hydrocarbons, and Type 2 (c) Trifluoro-Vinyl Chloride Polymers. The most widely used in industrial equipment now are Type 2 (a) fluids. The Type 2 (a) fluids operate well at the temperatures normally found best suited for aqueous base and petroleum base fluids, 120 F to 140 F. At high temperatures the Type 2 (a) fluids thin out because of the low viscosity index and "wire drawing" is liable to take place in valves and cylinders.

It is recommended that large reservoirs be used with the phosphate base fluids as air retention is usually more-prominent than in petroleum base fluids having like viscosities. By proper design of baffles, suitable vents, and an ample size reservoir de-aeration can take place before the fluid moves into the suction line of the pump.

Phosphate base fluids usually do not present any corrosion problems unless they become contaminated with some foreign material such as condensation, coolants, and cutting oil. They do, however, present a coating problem. They have a definite solvent action on most paints and varnishes. It has been found that the red sealer used in many oil reservoirs will dissolve or peel when a phosphate base fluid is used. Check with the manufacturer of the fluid power components to determine if the coatings which he uses will resist the phosphate base fluids. If not, all of the coatings should be removed from the



The symbol, and the spirit, of the fighting gamecock lives on with the commissioning of the powerful aircraft carrier, *USS Saratoga*.

The incident which gave birth to this 142 year old Navy tradition took place on the decks of the first *Saratoga* as she closed for action against four men-o'-war in 1812. In the opening minutes of the engagement an enemy ball landed on deck – crashing into a coop containing a gamecock brought aboard by a sailor.

With a flurry of feathers, the startled bird flew to the rail and, as if expressing his personal indignation, crowed lustily and defiantly. Taking this as an omen of good luck, the outnumbered and outgunned American ship entered the battle with new courage and completely won the day.

The Navy's newest aircraft carrier is the fourth ship to bear the name *Saratoga* and adopt its fighting symbol. As aboard its sister aircraft carriers, the USS Forrestal, USS Independence*, and USS Ranger*, Walworth Valves and Fittings are installed. We are proud of the many contributions that our products and engineering skills have made to these outstanding vessels.

Walworth products installed aboard these ships include Pressure-Seal Cast Steel Gate, Globe, and Angle Valves, Fabricated Cast Steel Manifold Valves, Cast Steel Y-Globe and Angle Valves, Bronze Gate, Globe, Angle, and Check Valves and thousands of Walworth pipe fittings including Walseal® Fittings, Flanges, and Unions.

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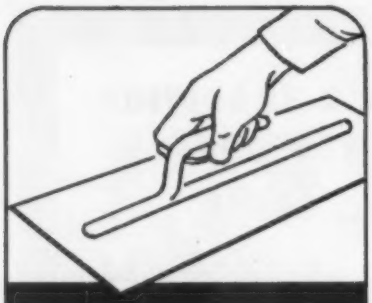

Trowel on

CORROSION RESISTANT FLOORS

with your own plant labor

New Chem-Top floor surfacing compound gives you a dense, non-porous, rock-hard floor that withstands impact, wear and corrosive action. Chem-Top Floors outwear other acid-proof floors, cost much less.

Chem-Top Floors are chemically inert, won't react to acids, salts, oils, alkalis or grease. Spilled industrial chemicals, brine, inks, greases or dyes can be wiped up without even a stain. Chem-Top is excellent, too, for surfacing drains, tank linings or walls.

Four times tougher than concrete, Chem-Top has a compressive strength of 40,000 to 50,000 lbs. PSI as against 10,000 to 14,000 for the best concrete.

Plant labor can apply. Prepare floor according to directions, then trowel on a layer ⅛" thick. You'll get a smooth, burnished floor that is slip resistant and easy to keep sanitary. Added floor height around drains, sills and equipment is negligible.

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interior of the components otherwise you are headed for trouble with your components.

Phosphate base fluids have a swelling effect on most types of synthetic rubber seals such as cup packings, rod packings, shaft seals, etc. The swelling would have very definite effect on solenoid operated and spring offset type control valves. It has been found that steam packings have swollen so much that these means of operation could not shift the valves. Packing and seals made from butylrubber, teflon, nylon, and silicone work most satisfactorily. Leather packings when unpregnated with rubber and waxes have been a source of trouble. When changing a system from petroleum oil to phosphate base fluids, all seals should be changed.

Tests show that the non-aqueous base fluids have very good wear resistant qualities. These compare to those of the better grades of petroleum oil.

If you should decide to change your system from one type of fluid to another, be sure that the system is given a complete cleaning. This will be discussed thoroughly in the next article.

Whatever type of fluid you choose, remember these points:

1st: Make certain that it will be suitable for the components in the system.

2nd: Choose the best grade possible.

3rd: Keep the fluid clean. It is said that seventy-five per cent of all hydraulic maintenance trouble is caused by dirty fluid.

Lamp Maintenance

(Continued from page 111)

with the floodlights. Some sort of record system should be maintained and again this will depend entirely upon the size of the installation and the scope of the maintenance program planned. On smaller installations, just a card file with possibly a relamping record on one side of the card and a repair record on the other side will suffice.

Actual execution of the maintenance plan will involve relamping, cleaning of the lights and reflectors, and checking the general operating conditions such as voltage and associated equipment. In regard to relamping, this again will depend upon maintaining a light level which is much more important in a 24 hour shipyard type of operation than it would be in the plant parking lot operation.

In the operation where production is to be carried on under lights it is essential that the level of light output be kept high. This would lend itself to group replacement. On a small in-

ILLCO-WAY ionXchange

"PACKAGED" DE-IONIZERS

Right, standardized Model MB Mixed-Bed De-Ionizer available in four sizes for maximum flow rates ranging from 150 to 1000 gals. per hr.

Left, typical Model LU or HB Two-Bed De-Ionizer, each series made in six sizes covering maximum flow rates ranging from 150 to 1000 gals. per hr.

COMPLETELY ASSEMBLED AND TESTED AT FACTORY

If you can determine the capacity and flow rate you need, you can pick out a *ready-made* ILLCO-WAY unit that is all set to be hooked into your lines and go to work. Three series of models are designed to provide different degrees of water purification and different types of treatment, as required by individual situations. All models and sizes have been thoroughly time-tested and have proved highly satisfactory in hundreds of installations.

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Each one of these "packaged" De-Ionizers is assembled at the factory, the resins put in the tanks, and the completed unit given a working test. Then, without dismantling in any way, it is crated, and is ready for shipment. *For full details and specifications, write . . .*

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a complete line to meet virtually every combination of floor conditions, weight and speed requirements!

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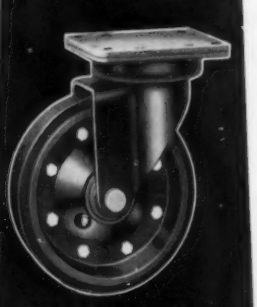
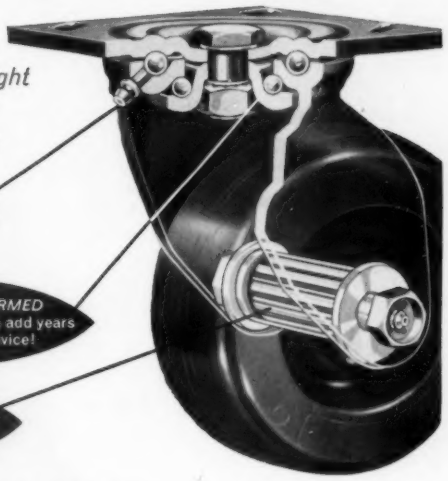


No. 5 Series • EXTRA HEAVY DUTY STEEL CASTER (Rigid or Swivel)
Practically indestructible, even under heavy shock loads. Perfect for power drawn trucks. Flexible spring surrounds thrust bearing to retain lubricant and keep out dust and dirt. Capacities from 1200 to 1500 lbs. per caster.

No. 3 Series MEDIUM DUTY CASTER (Metallic on Non-Metallic Wheels)
Ball bearing swivel model with rubber tire wheel. Durable construction assures long life and easy operation under heavy loads. Capacities from 300 to 400 lbs. per caster.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ACCURATELY FORMED and hardened raceways add years of trouble-free service!
PRECISION BEARING assembly for smooth, silent, easy rolling!

No. 4 Series • PRESSWELD CASTER
Unbelievably efficient, low cost, lightweight caster . . . ideal for dollies, racks, box trucks, etc. Unbreakable fork and top plate. Capacities to 800 lbs. per caster. Non-sparking phenalic resin tires highly resistant to industrial oils and acids.

Make old equipment roll like new with smooth, silent, easy rolling COLSON casters. Let a COLSON specialist help you choose from more than thousands of different types to match your present equipment and plant conditions.

COLSON swivel and rigid casters are available for light, medium and heavy duty with forged steel, cast steel, semi-steel iron, malleable iron, plastic, pneumatic and Mold-on Rubber wheels. They'll save more than enough to pay for themselves by increasing production flow, prolonging floor life and lowering maintenance costs.

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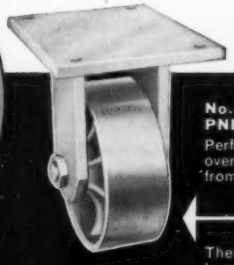

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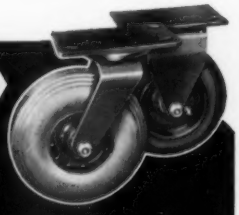

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The world's finest caster for extra heavy duty requirements. Capacities from 700 to 6,000 lbs. per caster.

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stallation where a 10 to 15 per cent change of light level isn't too important, relamping may wait until a certain percentage of lamps is out and then these lamps are replaced.

Normally it is not economical to try to run lamps beyond their rated life because the rate of failures after 85 to 90 per cent of rated life starts increasing very rapidly and, as the cost of replacing the lamps is usually higher than the cost of the lamps themselves, it is usually more economical to replace all of the lamps when they approach 100 per cent of rated life. Therefore, it is important that records be maintained indicating the number of hours that the installation is in operation.

Cleaning of the lamps and reflectors is entirely a problem of location and atmosphere. An installation in heavy industrial areas or near railroad yards will have its efficiency cut down as much as 50 per cent when an installation in a suburban area will lose 5 per cent in the same length of time. Naturally everyone wants to get the best out of the installation; the cleaner the lights and reflectors are kept, the closer to the designed efficiency the light level will be held.

In fact it is sometimes possible to get a little more out of the system than it was designed for because there is usually a depreciation factor figured in which includes a certain percentage for loss due to dirt. The balance of the depreciation factor is usually made up in the normal losses of lamp output due to age.

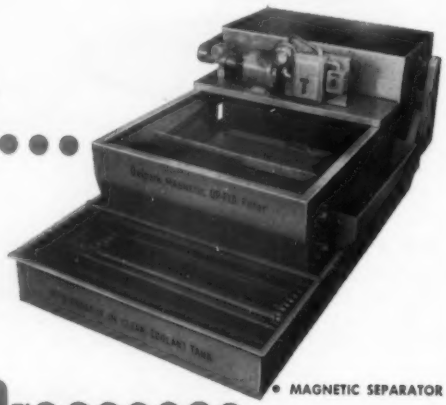
An important factor in any electrical installation is the maintenance of proper voltage. In connection with floodlighting, this is very critical. Table I shows the effects of under and over voltage upon filament lamps. You can see how by operating at 4 per cent over voltage the life of your lamps is reduced 40 per cent. Conversely, if operated 4 per cent under voltage your lamp life is increased but your light output is reduced. So the best all around performance should be realized if you operate your installation at rated voltage. Then you will be able to have 100 per cent of rated light output and 100 per cent of lamp life.

In order to maintain the proper voltage, checks should be made to see that the voltage is maintained at a satisfactory level and probably then the best way to start off is to put a recording voltage meter on the circuit for a short time. Once it is seen that the voltage is satisfactory, periodic checks to see that it is maintained would suffice. If it is found that the voltage varies greatly, perhaps it would be better to have a regulator installed.

To summarize, maintenance should not be a hit or miss operation but should be a planned program. This will pay dividends in full utilization and efficiency of your floodlighting installation, as well as your production equipment.

1 Unit...

3



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Combines the new Delpark powerful magnetic separator with a permanent filter media bar stock screen. Swarf bearing liquids flow on top of a large flat magnetic field. Magnetic unit incorporates more Alnico #5 magnets, gives twice the width of field, brings all swarf in suspension within the influence of the magnetic field, puts gravity to work in assisting the magnets and prevents washing and turbidity by using low velocity flow. This feature is particularly desirable on high viscosity fluids.

Three cleaning devices, completely automatic, remove the separated residue from the unit. Chain driven flights remove deposits from the magnetic field and the bar stock screen. .004" bar screen is cleaned by an air shaker device to dislodge enmeshed particles. A drag-out unit is built into the clean coolant tank.

Up-Flo Filters are available without magnetics for non-ferrous metal applications.

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"Extra" Man for Plant Engineer

(Continued from page 114)

extent, yet provide for gradual conversion to higher voltage supply. Their first presentation of the project met with many questions from the home office, and the power salesman offered to frame the letter of reply. His letter translated the project to a dollar and cents basis and answered the questions. The project was promptly approved.

Economical use of power and wiring. A chemical laboratory needed a small, intermittent supply of steam and asked the power salesman for recommendations. The service wiring of the building required changes to accommodate the electric steam boiler recommended, so a double throw switch was utilized to disconnect a seldom used air compressor while the steam boiler was operating. This proved the economical solution until the labora-

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One large capacity seat for all pressures!

New Sarco Thermodynamic steam trap. Sizes ⅜ to 1" . . . each body as small as a tee fitting! Capacity is determined, not by a bulky body, but by the effective orifice, valve action, pressure drop and condensate temperature.

1. Cuts trap inventory—with the revolutionary Sarco TD steam trap, you use exactly the same trap... with exactly the same large capacity seat... for all pressures 10-600 psi... for heavy, light or no condensate load. Sizes ⅜ to 1".

For example, you can use the same Sarco Self-Adjusting TD on unit heaters (15 psi), on plastic presses (100 psi), on steam mains (450-600 psi)...without changing a single part...without adjustment.

Inventory greatly reduced... maintenance simplified.

2. All pressures 10 to even 600 psi!—without changes or adjustments. Self-adjusting. A trap with high pressure construction... at a low pressure trap price!

3. Operates perfectly when pressure fluctuates—absolutely no effect even from 600 to 10 psi! No water seal to evaporate. No adjustments.

4. Widest capacity range—the Sarco TD uses same large capacity seat for 10 as for 600 psi. Pressure of incoming air and condensate INSTANTLY AND FULLY raises valve head (disc), permitting maximum discharge.

5. Operates equally well on all loads—on heavy, light or no condensate load. No prime to lose. No adjustments.

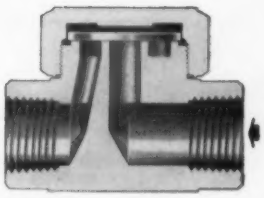
6. No steam leak required to operate the Sarco TD. Closes tight against steam!

7. No oversizing worries—you can size the Sarco TD for peak condensate loads... without risk of blowing steam on light loads... no prime to lose... no adjustments.

Convince yourself by 60-day trial... use coupon!

SARCO

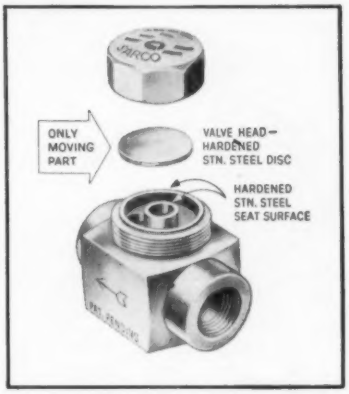
For more facts circle 624 on Reply Card



Trouble-free design

Here is a trap so simple, it doesn't even have a valve closing mechanism. The kinetic energy of steam closes the valve. ONLY the new Sarco TD uses this operating principle.

No mechanism parts to wear or stick. No narrow channels to choke. No gaskets to leak.



Maintenance practically eliminated

The all-stainless steel Sarco TD has only 3 parts... cap, disc and body. Only moving part is a hardened SOLID stainless steel disc, practically wearproof.

SARCO COMPANY, INC.
Empire State Bldg., N. Y. 1, N. Y.

Please send me Sarco TD Steam Trap and strainer for 60-day trial.
Size_____ For use on_____

_____

Name_____

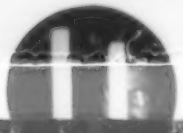
Firm_____

Address_____

City_____ State_____

2181-86

Ask these questions, too, when you judge a fluorescent lamp...



Is your investment protected?

Check Westinghouse Fluorescent Lamps against any other brands you are now using. Check them for maintained bright-

tory was removed to larger quarters.

A schedule for preheating electric furnaces at different times of the day to minimize the demand charge and secure most economical use of service, was developed by engineers of a tool manufacturing company with the assistance of a representative of the local utility company.

Special equipment design. One manufacturer wanted to preheat commutators on the small electric motors that they manufactured. The power salesman provided some sample electric heaters to test the time required for heating by this method. With this information he was able to suggest a conveyor design and the type of heaters to use.

Special equipment application. Possible applications of high frequency heating often come to the attention of power salesmen. Sometimes, there is a better way to do the job than the one used and this is brought to the attention of the plant engineer. Where the application is promising, the power salesman calls in vendors, and helps work out the overall project.

engineer, busy with planning projects at the time, was spared many interviews and details—the power salesman functioned as his staff representative.

Plant Instrumentation

(Continued from page 95)

major portion of these necessities well in advance of the date of use. Determination of quantities of these items requires a knowledge of installation requirements based upon experience plus ability to estimate when using preliminary plant plot layouts. It is desirable to attempt to order about 60 per cent of the requirements.

Quotation requests may be prepared upon the basis of the instrument specification schedules, instrumentation system specifications, preliminary valve sizings and primary differential unit summary. Requests to quote should be definite enough to reflect the project correctly, but not too tight to eliminate suppliers who offer instruments that would be acceptable. Final design under any circumstances is done on the basis of equipment to be

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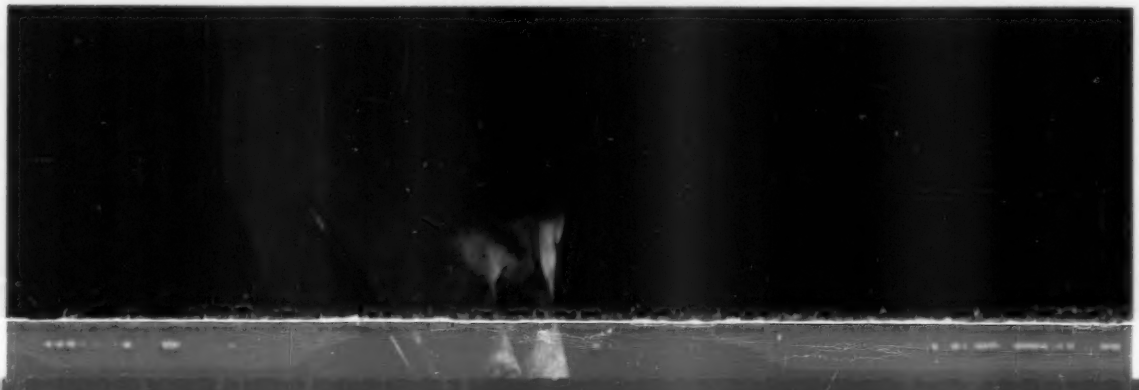
how to judge a fluorescent lamp ...point no. 6



how to judge a fluorescent lamp ...point no. 6

Ask these questions, too, when you judge a fluorescent lamp...

Is your investment protected?

Check Westinghouse Fluorescent Lamps against any other brands you are now using. Check them for maintained brightness, long life, uniform appearance. If you are not entirely satisfied on all counts, your full purchase price will be refunded.

Is it easy to seat securely?

Westinghouse fluorescent lamps are built with "guide bumps" on the end-caps. Easily felt with the fingers during lamp installation, they tell at a touch when the lamp has been securely seated in its sockets.

Is it the correct type, size and color for the lighting job to be done?

In the Westinghouse fluorescent family of 290 different lamps—including Slimline and Rapid Start—there's a type and size precisely right for every office, plant and merchandising application. Colors include seven different shades of "white" alone.

For the full story on how to get more for your money in fluorescent light, contact your Westinghouse Lamp Representative.

WATCH WESTINGHOUSE

WHERE BIG THINGS ARE HAPPENING FOR YOU!

For more facts circle 625 on Reply Card

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Plant location. A manufacturer, controlled from out of state, was faced with the proposal that one division of the plant be moved to another state and expanded. The local management felt that the expansion should be made locally, and asked the power salesman to give his opinion in the case. The utility's industrial development engineer was asked to name local manufacturing sites suitable for the proposed expansion. The advantages of the local manufacturing area were stressed. As a result of the combined effort, the expansion was made nearby.

Lighting. Assistance in rebuilding a fire damaged plant included a plan for lighting the entire building suitable for manufacturing areas, even though a large portion was to be utilized for storage. The wiring was installed immediately, but the fixtures were added only as the manufacturing area expanded. The plan permitted orderly growth with a low first cost and eliminated the losses attending wiring changes. Within three years, expansion had forced the storage area to a new warehouse addition.

Integrated studies. A manufacturer who contemplated a large new building accepted the power salesman's offer to secure proposals for heat treating equipment involving about 25 units. Given drawings and production rates, the power man asked for bids from a number of furnace manufacturers, analyzed them and presented integrated proposals to meet the needs. Details of several differently priced "package propositions" were included. The plant engineer, busy with planning projects at the time, was spared many interviews and details—the power salesman functioned as his staff representative.

Plant Instrumentation

(Continued from page 95)

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Quotation requests may be prepared upon the basis of the instrument specification schedules, instrumentation system specifications, preliminary valve sizings and primary differential unit summary. Requests to quote should be definite enough to reflect the project correctly, but not too tight to eliminate suppliers who offer instruments that would be acceptable. Final design under any circumstances is done on the basis of equipment to be furnished. This means that all specifications must be revised to reflect the characteristics of the actual instruments and equipment to be purchased.

Completion of the phases of design and construction of the instrumentation which have been discussed in this article, would bring the job up to a condition under which definite engineering may proceed toward the installation of the systems and instruments selected.

Kit System Rebuilds Machines

(Continued from page 117)

5. A material parts kit list is prepared by the shop supervisor and submitted to Work Control.

6. Work Control then prepares a shop card and holds it, chronologically, in the files according to scheduled overhaul date.

7. Work Control checks the material list and prepares a purchase order requisition. Delivery of material is keyed to the overhaul schedule.

8. Upon delivery of materials, the Work Control section releases the shop card to the rebuild shop for execution.

9. The timekeeping section reports the labor hours on the Shop Order on a daily basis. Work Control maintains a running record of labor charges on a Labor Control Card.

10. Upon the job's completion, list of unused materials from the material kit is prepared and forwarded to Work Control.

The kit system is returning machine tools, to production within 10 days.

how to judge a fluorescent lamp . . . point no. 6

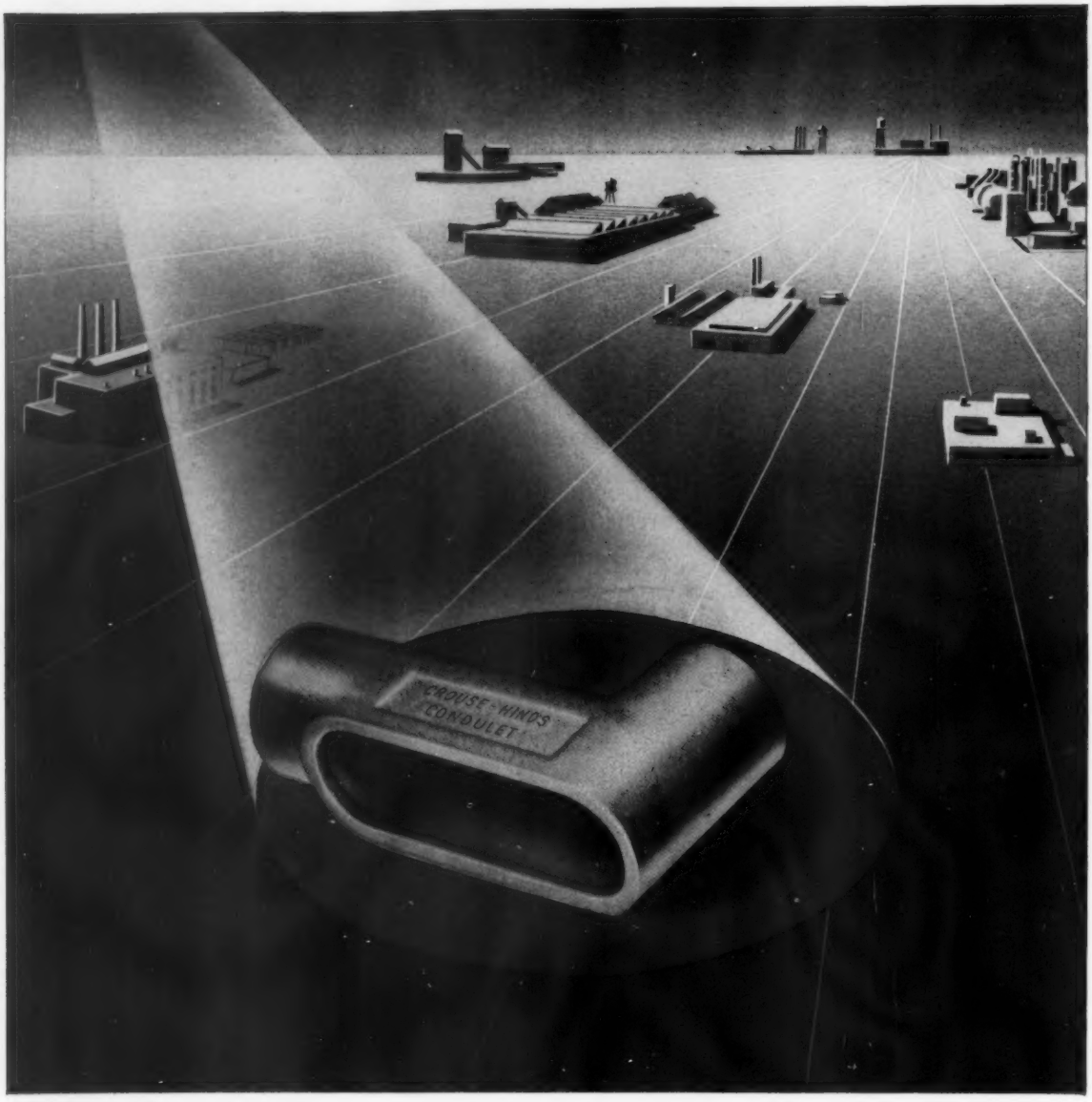
ask about LUMEN MAINTENANCE

Building fluorescent lamps with high *initial* lumens—high light output when the lamps are new—is difficult enough. But the real trick is to build them with high "lumen maintenance" —high light output over their entire long life. Lumen maintenance depends largely upon the stability of the lamp "phosphor"—the light-producing coating inside the glass tube. Stable phosphors give high lumen maintenance; unstable phosphors do not. Tops for stability among the different types of phosphors now in use are *Halo* Phosphors. Westinghouse (and only Westinghouse) uses Halo Phosphors throughout its whole fluorescent lamp line.

WATCH WESTINGHOUSE

*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU!***

For more facts circle 626 on Reply Card



Still the standard of quality in rigid conduit fittings

Condulets* have been widely imitated since Crouse-Hinds introduced them more than 40 years ago . . . *and that's all to the good!*

Imitation by others has kept us on our toes . . . made us constantly improve our product to stay *ahead* of competition.

As a result, most conduit fittings today incorporate many basic features pioneered by Crouse-Hinds—but lack certain refinements that put Condulets in a class by themselves, head and shoulders above the rest.

What other fittings, for example, include these improvements:

. . . an ingenious *Cover* design that eliminates protruding screws or ears in the housing—common causes of cable damage.

. . . a longer *Hub* that permits full tightening of conduit and fitting without causing conduit to bottom on the integral bushing.

. . . a corrosion-resistant Feraloy *Body* plus a triple-layer *Finish* that exceeds Federal and UL specs. for lasting protection.

These years-ahead Condulet features have yet to be equalled. You get them in all 45 types of Obround Condulets ranging in size from ½" to 6". See your Crouse-Hinds distributor. Crouse-Hinds Company, Syracuse 1, New York.

*Registered

CROUSE-HINDS COMPANY

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110 South Dearborn
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AUGUST, 1956
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Your Company Name .....

Company Address..... City..... State.....

(Company name must be given. If you prefer delivery at home, also fill below)

Home Address..... City..... State.....

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BULLETINS

(Begins on page 23)

TOOLS, WELDING, AND MACHINE SHOP EQUIPMENT

161 New Tooling Concepts—Catalog 112, 48 pp, tells how to load a machine fast enough to keep it cutting in both directions; how to reduce production set-up time; how to position work to any angle automatically; and how to save time, labor and money with company's tools for automation. Covers powered clamping tools, tooling methods, and includes photos, drawings and specifications on manufacturer's complete line of equipment. Wilton Tool Mfg. Co., Inc.

162 Tools for Woodworking—Form AD-964, 8 pp, which unfolds to form a wall chart, includes photo-illustrated descriptions and condensed specifications of company's principle power tools. Features the 10-in. tilting arbor bench saw and combination 10-in. bench saw and new 6-in. jointer, among others. Delta Power Tool Div., Rockwell Mfg. Co.

163 Ten-In. Circular Saw—Special advantages of a new 10-in. tilting arbor bench model circular saw are shown in this bulletin. Five major features of this big-capacity low-cost saw are described and illustrated with action photos and cutaways. Includes table of specifications for the machine, and catalog listings for motors. Delta Power Tool Div., Rockwell Mfg. Co.

164 Resistance Welding Products — Now available to qualified plant engineers is a 56-pp book on resistance welding products, accessories and materials. It describes and specifies standard and special spot welding electrodes, seam welding electrode wheels, dies, back-up bars, shafts and bushings. Sections are devoted to recommendations and usage of special alloys and electrode materials, applications, specification charts on physical and mechanical properties of Weldaloy alloys and Weldtung copper tungsten alloys. Weldaloy Products Co.

INSULATION

165 Duct Insulation—Engineering data and application instructions for company's semi-rigid, spun mineral wool duct insulation are presented in this informative bulletin. Thermal and sound absorption characteristics are presented in tabular form and physical, chemical, mechanical and handling properties described. Baldwin-Hill Co.

166 Electrical Insulation — Advantages of Fiberglas-base insulation materials are described in this 6-pp folder. Such qualities as high thermal endurance, reduced space factor, high moisture resistance and other properties of Fiberglas tapes, braids, and cloth are stressed; and comparison graphs showing properties of Fiberglas-base materials and those using other kinds of textile bases are included. Owens-Corning Fiberglas Corp.

HEATING, COOLING

167 Modern Process Heating—In 16 pp of photos and text, this catalog explains recent techniques in modern process heating, including a method of combining radiation with convection. Shows how these heating and conveyor systems offer safety, high output of energy, greater conservation of heat energy, controlled heat distribution, other benefits. Covers applications of booster ovens and complete systems. Jensen Specialties, Inc.

168 Heating, Cooling Coils—This 36-pp catalog covers company's standard line of Tru-Air heating and cooling coils, illustrating helical fin construction and fabrication methods. Capacity tables and selection graphs are included, along with data on selection of water, heating and cooling coils, standard and non-freeze steam coils, and dimensional details. M. Blazer & Son.

169 Vapor Condenser—Bulletin 129R features engineering data on the Aero vapor condenser, with diagrams and photos illustrating operation. Pictures units cooling reflux liquids and condensing vapors at top of distillation towers. Niagara Blower Co.

FOR PLANT ENGINEERING REFERENCE FILES

170 Saw Manual — This how-to-do-it booklet is a 26-pp guide to the use of company's Model 148 Bayonet saw, a heavy-duty portable jig saw featuring orbital blade action. Gives valuable suggestions for plunge cutting in wood, laminated plastics and plywood, as well as for notching and shaping stock. Hints are offered for using the saw for sawing galvanized sheet metal and flat or bar steel. Special applications, such as cutting paper, leather, cloth, asphalt and rubber floor tile, are explained. Book is available to qualified plant engineers, please state your job title. Porter-Cable Machine Co.

171 Power Transmission Machinery—Engineering Catalog D-56 packs 328-pp of helpful information on company's line of mechanical power transmission products into a handy pocket-size handbook. Provides sectional drawings, dimensions, weights, prices, application details and engineering tables, with an 8-pp index for quick reference. Products covered include bearings, chains, clutches, collars, couplings, pulleys, shafting, speed reducers, sprockets, V-belt drives, also Flexidynes, others. Book is available to qualified plant engineers; please state your job title. Dodge Mfg. Corp.

172 Welding Procedures—Pocket Data Book T IS 2575 covers 120 welding rods, electrodes and welding compounds. A 174-pp guide to torch and metallic arc welding, brazing and soldering, it covers fabrication, maintenance repair and salvage, overlaying, and welding of dirty, rusted parts. Special applications such as joints with high electrical conductivity, resistance to chemicals, tinning and plating are treated, also methods of removing unwanted metal. Weld preparation steps, ways to save dismantling, pre-and-post-heating, color matching deposits, how to increase weld strengths are among features. More than 60 low temperature welding alloys are listed. Lowest possible application base metal heats are given for each base metal, filler metal, flux and joint design and methods of minimizing or eliminating tension and changes of metallurgical structure of base metal included. Available to qualified plant engineers. Please state your job title when requesting this. Eutectic Welding Alloys Corp.

178 Lubricant Data Book—The 16-pp newly revised edition of this company's Lubriplate Data Book offers practical information on lubrication of machinery. Gives product data on grease type and fluid products, hydraulic oil, compressor oil, motor oil. Suggestions on applying lubricants under normal and special conditions are provided. Several pages are devoted to lubricant recommendations for equipment used in a variety of industries—bottling plants, chemical and food processing, metalworking, iron and steel plants, textile plants, woodworking, pulp and paper machinery, elevators, water and sewage disposal plants. Lubriplate Div., Fiske Bros. Refining Co.

179 Roller Chain Guide—One of the most complete lines of roller chain and sprockets made is described in 148-pp Book 2457. It includes sections on stock drives, drive chain, conveyor chain, installation and maintenance, lubrication, sprocket wheels, casings, and chain tighteners, among others. Profusely illustrated, the book gives all the information necessary to choose the right chain for a given application. Although not newly published, this book is a standard product guide and is again made available to qualified plant engineers, who may not have known of it. Link-Belt Co.

PAINTING

173 Painting Acoustical Surfaces—Information on painting acoustical surfaces, including ceiling tile, acoustical plaster and aggregate block is offered in this illustrated folder. Written in non-technical style, the specification recommends using a nonflammable, matte finish, casein base paint which decorates without impairing sound absorption and fire retardant properties of surfaces. Luminall Paints Div., National Chemical & Mfg. Co.

174 For Efficient Painting—Eight-pp Form F-286 discusses in detail the six major benefits offered by company's hot spray painting method, including better finishes, material savings and faster application. Reasons behind these advantages are also explained. Some typical installations of the hot spray systems are illustrated. The DeVilbiss Co.

VENTILATING AND AIR CONDITIONING

175 Air Diffusers—Twelve-pp Bulletin K-27 gives selection and performance data on Kno-Draft square and slotted series air diffusers. Illustrated with photos of various models and of typical installations, this booklet provides dimensions and selection charts, suggestions for use of each type of diffuser. Special features of slotted diffusers, for interiors requiring a linear type of outlet, are detailed. Connor Engineering Corp.

176 Exhaust Fans—Axial flow, direct-connected exhaust fans for a variety of applications are described and illustrated in Bulletin 500, 8 pp. In addition to several types of general exhaust fans, bulletin also shows mancooler fans, roof ventilators and penthouse units. Performance ratings and specifications are provided, also hints on installation, and a table of average air changes covering boiler rooms, engine rooms, machine shops, warehouses, others. M & E Mfg. Co.

177 Propeller Fans—Forty-pp Bulletin A-109B contains new fan sizes not shown in company's previous catalog on propeller fans. Also provides revised air deliveries, specifications, performance data and dimensional drawings on the entire line. Standard propeller, utility, cool-blast, Lo-Noise, reversible and Bi-Pass duct fans, intake air units and unit heaters are shown. Hartzell Propeller Fan Co.

Reader Service Cards for ordering bulletins are on pages 187-188. Be sure to include your name, job title, and company.

180 Roof Ventilators—Sixteen-pp Bulletin A-112, revised, covers manufacturer's line of roof ventilators. Provides information on a reversible roof ventilator, also penthouse Vertijet, rotary and other models. Sizes, specifications, performance data and dimensional drawings are included. Hartzell Propeller Fan Co.

181 Improved Air Conditioning—This 12-pp booklet with flow charts in colors covers company's "staged cycle" and "closed reversing cycle" air conditioning methods and tells how they eliminate certain inefficiencies found in many air conditioning systems. Describes each principle and includes comparative power requirements, increased capacity data, as well as photos of typical installations, diagrams and charts. A. I. McFarlan Co., Inc.

PLANT LAYOUT AIDS

182 Visualization Made Easier—Twenty-pp Form 4C-50-3-56 describes Chart-Pak method of making organization and flow charts, graphs, office and plant layouts by "drawing" them with pressure sensitive tapes and templates. Tells how commonly recognized lines, shapes, bars, symbols and die cut office furniture templates, pre-printed on tapes or sheets with adhesive backing, may be mounted on plastic planning boards. Chart-Pak, Inc.

183 Three-D Models—Three-dimensional engineering and design models for process and power plants are described in this 8-pp booklet. Plotting models, wire-and-washer models and detailed scale models are discussed and illustrated. Atkins & Merrill, Inc.

METALS, METAL PARTS

185 On Aluminum Bronze—"What's New in Aluminum Bronze," is an 8-pp comprehensive report. Illustrated with tables, charts and

BULLETINS

(Begins on page 23)

photos. Covers the development of nickel-aluminum bronze for marine propellers, and the application of the material in power, electrical, metal working and process industries. The International Nickel Co., Inc.

186 **Nickel and Nickel Alloy Tubing**—Catalog 12, 20 pp, features brief handbook information on nickel and nickel alloys. Specific mechanical properties and chemical compositions of 13 analyses of nickel and nickel alloy tubing drawn at company's mill are tabulated, and selection and application data is included. Line drawings and photos illustrate the text. Superior Tube Co.

187 **Centrifugal Castings**—Information on centrifugal castings is offered in five product bulletins. Bulletin 150 covers centrifugally cast machine parts and assemblies of non-ferrous metals, including bronzes, monel metal, nickel, aluminum and special alloys. Bulletin 151 features centrifugally cast parts of Meehanite metal, Ni-Resist, and special iron alloys. Bulletin 152 covers tubular and solid types of Meehanite metal bar stock. Centrifugal castings of Ni-Resist are detailed in Bulletin 153; and an alloy chart showing comparative specifications, chemical analyses and minimum physical properties of non-ferrous alloys is featured in Bulletin 154. Shenango-Penn Mold Co.

OTHER EQUIPMENT

188 **Descaling Machines**—Of interest to plant engineers concerned with hot rolled or heat treated steel sheets, plates and coils is 16-pp Bulletin 608. Describes equipment for continuous, mechanical descaling by shot blasting. Photos and drawings illustrate construction details, actual installations and specifications. Savings in space and processing over pickling are presented. Pangborn Corp.

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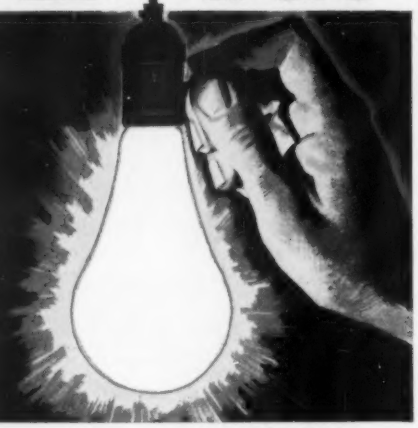

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3. **Look at the records** of the parties and candidates.
4. **Get active** in politics.
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7. **Decide** for yourself.
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9. **Allow time to vote.** Make a date with yourself and keep it.

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189 **On Teflon Products**—Twelve-pp Form T-110 on John Crane products made from du-Pont Teflon, gives information on this material and applications for which it can be fabricated. Includes properties, specification table, and descriptions of products, together with operational and service data. Products described include packings; gaskets; bellows; sheet, rod, tubing and tape; molded and machined parts; electric/electronic parts, insulation. Crane Packing Co.

190 **Chemical, Process Equipment** — Dry blending and heat transfer equipment for chemical and process industries is described in Catalog 14, 16 pp. Covers laboratory and production models of standard and special Twin-Shell, double-cone, and ribbon blenders; synthetic resin pilot plants of standard design; standard and special process heat exchangers; the Lever-Lock quick-opening door. Performance data is given and operating principle explained. The Patterson-Kelley Co., Inc.

191 **Asbestos-Cement Sheet**—This 6-pp folder, on company's Asbestocite, explains how this asbestos-cement sheet material can serve industry and shows typical applications: cooling tower housings, cold storage room facings, construction of fume hoods and ducts, others. Gives information on physical properties, sizes, thicknesses and dimensional tolerances. Also contains a section on cutting, working, applying. Johns-Manville.

192 **On Aluminized Wire**—Bulletin DH-537, 6 pp, describes manufacturer's Aluminized products—wires with strength of steel and corrosion resistance of aluminum. Some applications of this highly ductile wire are detailed. Physical characteristics, and other applications involving corrosion and corrosion coupled with high operating temperatures are discussed. Page Steel & Wire Div., American Chain & Cable Co., Inc.

193 **For Handling Flammables**—This bulletin is a handy guide to selection and use of company's equipment for safe storage, handling and use of flammables. Fully illustrated, products are in tabular form, according to operation. Products shown include storage and dispensing cans, storage cabinet, transfer pump, tanks, drum covers, fittings. The Protectoseal Co.

194 **On Chemical Cleaning**—This series of seven folders covers intangibles behind the chemical cleaning service offered by the company, such as training of cleaning specialists, accepted cleaning methods, safety consciousness, research, chemical cleaning equipment and service. Dowell Inc.

195 **Welded Tubes**—Bulletin TB-412 describes advantages of electric resistance welded carbon steel tubing in applications involving heat transfer. A chart outlining hydrostatic test pressures required for the various sizes of tubes under ASTM A-214 is also shown. Tubular Products Div., The Babcock & Wilcox Co.

196 **Retractable Cords**—Twelve-pp Catalog 556 covers company's complete line of retractable cords for industry and communication. Applications for these spring-like cords that extend to approximately six times their retracted length are illustrated and specifications tabulated. Koiled Kords, Inc.

197 **Products and Services** — Pocket-size Booklet PP-4, 16 pp, describes company's products and services for maintenance of boilers, oil burners, water supply systems, condensers, air conditioning and cooling systems. Both standard and new products are described. Also lists technical data available on each product. The Perolin Co.

198 **Resins For Electrical Use**—This illustrated booklet describes synthetic resin products for electrical use, and includes examples of typical applications with data on flexibility, viscosity, pot life, cure times and available forms. A compatibility chart shows how resins can be mixed in event ready made resins will not work for a particular application. Minnesota Mining & Mfg. Co.

200 **Vibratory Equipment** — Electro-permanent magnetic vibratory equipment, called HI-VI is presented in 6-pp Bulletin VB-1. The line consists of vibratory feeders to feed bulk materials at controlled rates of speed, and unit vibrators to speed and assure flow of materials from bins and hoppers. Bulletin describes design features and lists applications and operating advantages. Eriez Mfg. Co.

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FIG. 3003 WE—Steel Gate Valve
For 300 Pounds W.S.P.

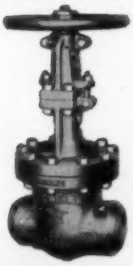

FIG. 11365—Steel Pressure Seal Horizontal Lift Check Valve
For 1500 Pounds W.S.P.

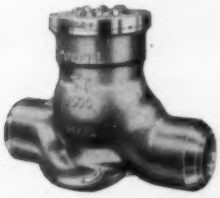

FIG. 11323—1500-Pound Motor Operated Steel Pressure Seal Gate Valve.

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DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided for you on pages 187-188.

ELECTRICAL

301 Variable Speed Motors—Sixteen-pp Bulletin 1797, revised, outlines many reasons why variable speed motors can be used to improve production, and it includes illustrations of all types of company's Varidrive motors, as well as their mechanical features, remote controls; etc. U. S. Electrical Motors, Inc.

302 Motor Buying Guide — Bulletin GEC-1026, 28-pp, features company's standard a-c fractional and integral horsepower motors in most general use. Included are general- and definite-purpose, fractional horsepower motors, and fhp gear motors. A section on selection of integral horsepower motors covers horsepower requirements, enclosures, starting current limitations, speeds, motor types, and selection of fuses and circuit breakers. Descriptions and specifications cover single-phase, polyphase, totally enclosed fan cooled, and gear-type integral horsepower motors. Photos, ratings, dimensions, weights, frame numbers, and modifications included. General Electric Co.

303 Motors, Brakes, Transformers—Bulletin G-55-2, 8-pp, outlines advantages of company's line of motors, brakes and transformers. Describes applications, construction features, and lists rating data. Wagner Electric Corp.

304 Motors—General specifications for company's open drip-proof motors and splash-proof motors, and enclosed motors are contained in 8-pp Bulletin 800. Includes data on construction features, electrical specifications, dimensions, mounting dimensions, as well as dimensional diagrams. Brook Motor Corp.

305 Polyphase Motors — Bulletin 103 provides design features of company's Loadstar polyphase motors conforming to new NEMA standards and also gives tabulated information on the changeover. Open drip-proof and totally enclosed fan cooled motors are covered. Photos show construction details. Leland Electric Co.

306 What You Should Know About Circuit Breakers—Sixteen-pp Manual 101 explains operating principles of basic circuit breaker designs and provides engineering data on factors of application. Includes simplified diagrams of three basic types. Illustrates with colored charts and diagrams, explains temperature factors, inrush current effects, tripping and reset time. Heinemann Electric Co.

307 FHP Manual Starters—Bulletin 224 is a folder giving the features and ratings of a line of fractional horsepower manual starters. Lists applications for them. Square D Co.

308 Testing Instruments — Bulletin 19-56, 16-pp, features company's electrical testing instruments, including ohmmeters, ground testers, dielectric test sets, motor rotation tester, cable fault locating equipment, transformer turn ratio test sets, corona test equipment, frequency meters, tachometers, others. Includes photos and descriptions of each type, including chief features, operating ranges, and suggested applications for them. James G. Biddle Co.

309 Enclosed Switches—Catalog 83, 28-pp, describes in detail enclosed switches for industrial applications. Included are general switches designed for use on either a-c or d-c purpose switches, sealed switches, heavy-duty limit switches, hand operated switches, and maintained-contact switches, all of which are available in a variety of actuator designs, contact arrangements and electrical ratings. Photos, dimensional drawings, circuit diagrams, electrical data are included. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

310 Commutator Slip Ring Maintenance—This practical little 40-pp handbook gives procedures and methods for commutator and slip ring maintenance. Generously illustrated with photos and sketches, booklet contains sections devoted to common troubles and their corrections; brushes; general maintenance; and company's products for maintenance of commutators and slip rings. Defines commutator terminology. Ideal Industries, Inc.

311 Panel Components—Bulletin EE-120 is a 54-pp panel builders handbook of electrical components, containing specifications, diagrams, dimensions, photos and price lists of company's motor control. Profusely illustrated with photos, dimensional and wiring diagrams, bulletin covers manual starters, relays and contactors, magnetic starters in non-reversing, reversing, and multi-speed types, and a group of accessories which include thermal overload relays, oil tight pushbutton units, limit switches, timing devices, solenoids, electrical interlocks, and solenoid-operated brakes. Cutler-Hammer, Inc.

312 Wire and Cable—Bulletin 1096, 16-pp contains detailed information on electrical wire and cable, as well as insulation and protective covering. Two selection charts—one by application and environment and one by cable type—are a practical guide to selection of best cable for a particular application. Minimum standard industry specifications are listed. Trade names are also given. The Okonite Co.

313 Aluminum Conduits — Bulletin 2681, 24 pp, lists copper-free aluminum conduits designed to resist corrosive action of many chemicals in highly corrosive locations. A pictorial index and price list cover the various types available. Crouse-Hinds Co.

314 Electrical Conduit—This 8-pp bulletin, Form 646, describes company's heavy-duty, rigid steel electrical conduit, reproducing test data sheets to show how the protected conduit stands up under corrosive attacks of salt spray, sulfuric acid, caustic acid, and exposure to excessive heat. Four-color photos illustrate the effects on this and other conduit after exposure to attacks listed above. National Electric Products Corp.

315 Battery Manual—Battery selection techniques are emphasized in 20-pp Bulletin 210, a revised edition of this manufacturer's manual on storage batteries for stand-by power, emergency lighting and switchgear applications. A discussion of charging equipment and simplified battery maintenance procedures is included. Storage battery installation procedures are described and illustrated by photos. Exide Industrial Div., The Electric Storage Battery Co.

316 Handbook on Storage Batteries—This 64-pp booklet of instructions and technical data is the sixth edition of this company's battery service manual. Provides a brief treatise on the theory of the lead-acid battery. Gives detailed instruction on the care and operation of batteries, on maintenance and repairs, and on standard and special parts. Booklet is of special value to plant engineers concerned with storage batteries for cycle service in industrial trucks and materials handling equipment. Gould-National Batteries, Inc.

317 Motive Power Batteries — This 48-pp general service manual on lead acid batteries for all types of motive power application is a practical guide to industrial cycle service, including industrial truck, air conditioning, and others. Includes photos, charts, tables, methods of repair, maintenance and theory of operation, instructions covering repairs with regular or special tools, simplified testing methods, including safety practices, acid handling precautions, and charging methods. C & D Batteries, Inc.

318 Cable Troughs—This 12-pp catalog offers a simple solution to any design problem of change of direction or elevation with a complete set of standard fittings, horizontal elbows, inside and outside vertical elbows, ties, crosses, covers and many special fastening devices to save time and labor. Contains full instructions for installations, load charts, accessory items, some typical installations and full list of distributors. The Globe Co.

319 Flexible Cords — This well-illustrated 24-pp booklet includes all new Underwriters' classifications for flexible cords manufactured by this company. Featuring data on Dynaprene and rubber jacketed cords as well as braid covered types, it also gives tips on how to select proper cord. Whitney Blake Co.

LIGHTING, COMMUNICATIONS

320 Fluorescent Lighting—This 24-pp fluorescent lighting guide book is a reference digest on fluorescent products. Gives advantages of this type of lighting; summarizes various lamps and parts, including starter sockets, lampholders. Includes reference chart for lamp performance when interchanged with typical ballasts. Sylvania Electric Products Inc.

321 Guide to Luminaires — Pocket-size, 28-pp Bulletin B-5799-BB covers fluorescent luminaires for industrial and other use. Summarizes salient features of each type of luminaire as it discusses electrical characteristics, maintenance and mounting data, details of construction, dimensions, and recommendations for application. Also contains a pictorial guide to floodlights and incandescent luminaires for industrial and other use. A 4-pp tabulation of buying data concentrates information needed for procurement. Westinghouse Electric Corp.

322 Industrial Lighting Units — The 36-pp 1956 Edition of the RLM Standard Specifications for industrial lighting units contains important revisions in specifications on both incandescent and fluorescent industrial lighting units, as well as new lighting data of special value to specifiers. Most important of the changes and additions are new coefficient of utilization tables for eight incandescent and fluorescent lighting units. Calculations are based on latest Zonal Method of computing coefficients of utilization and illumination on room surfaces. Also included are revised light distribution curves on RLM fluorescent lighting units. RLM Standards Institute, Inc.

323 Plant Lighting Planning Guide—This 32-pp handbook of industrial lighting presents economics of a plant lighting program in terms of lower production costs, reduced working time, less fatigue and eyestrain, less spoilage, fewer accidents, better morale. Explains six major steps in initiating, developing and carrying out a lighting program; tells how to select equipment and stresses importance of maintenance. Includes table of recommended levels of illumination for industrial interiors. Benjamin Electric Mfg. Co.

324 Portable Lamps—How these portable lamps light up dark areas and step up efficiency is pictorially described in Bulletin 5514. Typical applications are shown and various types and sizes illustrated. Day-Ray Products, Inc.

325 Signal Equipment — Tips on how to select suitable signals for any specific operation are offered in one of a series of bulletins—Nos. 100-125—bound in this 40-pp catalog. Other bulletins describe horns, bells, warning lights, other signal equipment. Specifications, photos, wiring diagrams, dimensions, audibility rating charts, electrical characteristics and other data included. Federal Sign & Signal Corp.

PUMPS, COMPRESSORS

326 For Hazardous Liquids—Catalog Section D, 12 pp, presents company's line of Underwriter rotary pumps for hazardous liquids. Both mechanical seal and deep stuffing box models are shown and dimensions and specifications provided. Various mounting arrangements and drives available for these UL approved pumps are also cataloged, and application suggestions are given. Also in this booklet are performance graphs. Viking Pump Co.

327 Condensed Pump Data — Form 4383-J covers more than 20 types of general service pumps, rotary pumps, sump and drainage pumps, condensate units, self-priming units, stainless steel pumps and high-pressure pumps. In easy-to-find tabular form, each model is pictured along with its charcteristics, applications and features. Goulds Pumps, Inc.

328 Solids Handling—Bulletin 121-A, 8-pp, describes non-clog pumps for handling solids in suspension. Included are vertical, horizontal and close-coupled types used to handle liquid components of industrial processes, industrial waste, and for such pumping applications as

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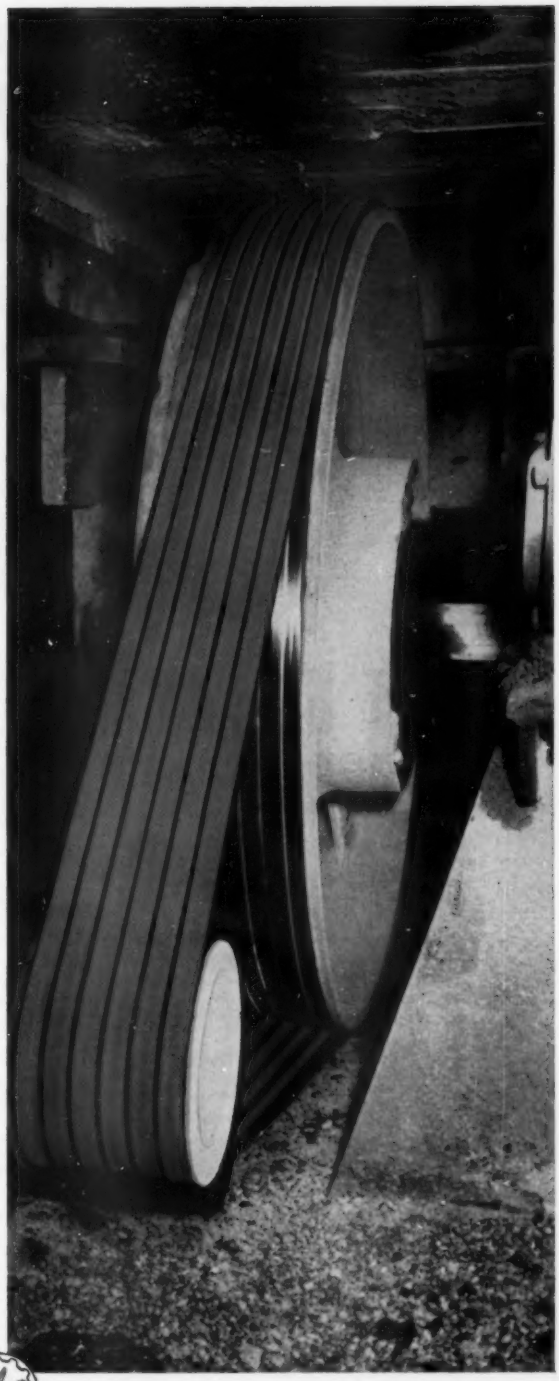

HERE'S THE NEW HEAVY-DUTY V-belt by Gilmer —built with load-carrying cords of "Dacron*" and easily identified by a distinctive red jacket!

Here's the V-belt that transmits up to 40% more power than standard V-belts... has longer flex life... absorbs greater shock loads... has more stretch-resistance... is practically unaffected by changes in humidity.

New multiple-belt drives designed to use this *Super Service* V-belt permit *savings* in both drive *cost* and *space*, since smaller sheaves, fewer belts and less maintenance are required. These narrower drives also make possible reduction of shaft overhang, and the amount of overhung weight.

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A worthy successor to the famous black-jacketed Super Service V-Belt, the *new* belt's distinctive red color insures against confusing it with other V-belts, guards against mixing with other types on the same drive, and serves as a guide in storing and reordering. The new "Dacron" tensile section is cushioned on bottom rubber especially developed to compress and release under higher tension with minimum heat generation.

The new Gilmer Super Service V-Belt is made in all standard multiple-drive sizes. Order from your nearby NYB&P-Gilmer Distributor. Consult your classified telephone directory for his name.

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DATA FILE

(Begins on page 192)

water supply, drainage and sewage handling. Specifications are included. Aurora Pump Div., The New York Air Brake Co.

329 **Compressor Data** — Feather valve compressors from 75 to 350 hp are described in 32-pp Bulletin L-676-B1A. Advantages on installation, operation and maintenance costs are outlined for types YC and DYC compressors. Information and illustrations are offered on component parts, including frame, running gear parts, intercooler, crosshead, motor and main bearings and various cut-away views are included. Variable capacity control information is listed along with data on governors. Diagram illustrates correct selection and coordination of auxiliary equipment. Worthington Corp.

330 **Compressors** — Bulletin A72, 36 pp, gives construction, operation information on company's Class WN-114 heavy-duty air compressors. Illustrates seven models of compressor as a single unit for displacement capacities from 1186 to 1948 cfm, twin units furnishing up to 3896 cfm. Joy Mfg. Co.

332 **For On-the-Spot Air** — Eight-pp Form 2302 features company's self-contained Spot-Air portable compressor. Deals with the many tools it will operate, with actual on-the-job illustrations pointing out added advantages of this light-weight compressor on jobs where bigger compressors are not needed. Ingersoll-Rand Co.

333 **Gas-Engine Driven Compressors** — A two-cycle turbocharged compressor is described in 24-pp Bulletin 134. Stresses economy of installation and operation afforded by this gas-engine driven unit, lists other advantages. Explains how turbocharging saves on fuel and cooling. Design and construction features are discussed. Clark Bros. Co.

PACKINGS, SEALS

334 **Mechanical Seals** — Bulletin AD-150, 8 pp, features complete data on Type BB-21A Mechanipak seal. Tells how it works and illustrates operation and design features with cutaway drawings. Typical applications are listed and specifications are tabulated. The Garlock Packing Co.

335 **Teflon Products** — Three bulletins present this company's Teflon packings, gaskets, special parts and stock. Bulletin CP552 describes Chempro lines of Teflon ring packing, Teflon impregnated asbestos packing, V-type packing, and Teflon seal cage—for use with acids and strong chemicals. Bulletin CP553 covers Teflon jacket gaskets, solid ring gaskets, expansion joints and special gaskets. Bulletin CP554 illustrates special parts. Chemical & Power Products, Inc.

SPACE, PROCESS HEATING

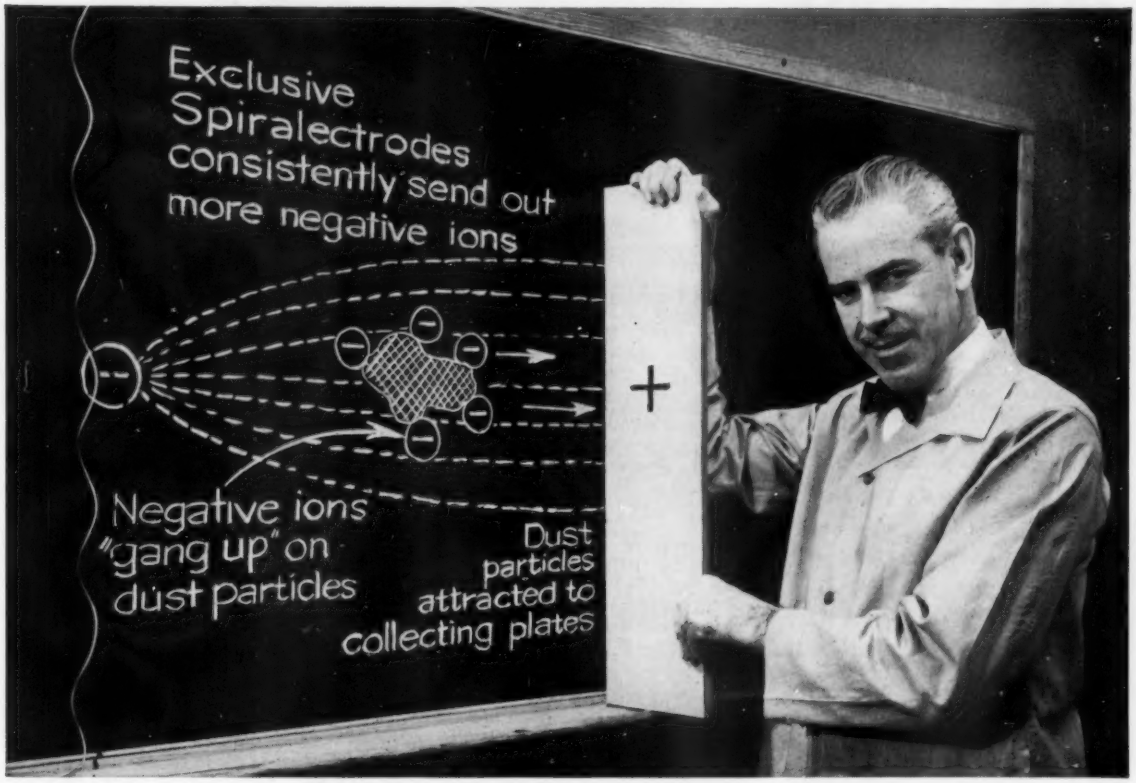
336 **Plumbing, Heating Supplies**—Edition H is the current edition of this company's 126-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and generously illustrated; gives sizes, intended uses. J. A. Sexauer Mfg. Co., Inc.

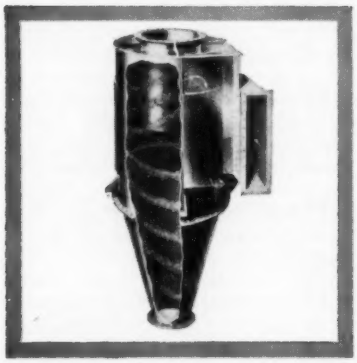
337 **Engineering Data for Heating Systems** —A great deal of helpful information on heating systems is presented in Engineering Data Manual 2695, 28 pp. Detailed illustrated information pertaining to heating problems is given. Besides covering heating terminology, there are sections on steam data, water properties, piping data, weights and measures and pipe dimensions. C. A. Dunham Co.

338 **Hot Water for Industry**—An excellent engineering data booklet, "Hot Water for Industrial Plants," is a compilation of literature covering use of water heaters for process needs, cafeterias, lavatories, wash fountains, laboratories. Discusses hot water requirements for these applications; describes and illustrates heaters, recovery systems, booster units applicable; provides installation suggestions and operating instructions. Available to qualified plant engineers. A. O. Smith Corp.

339 **Unit Heaters** — Catalog 155, 32 pp, presents unit heaters for steam and hot water

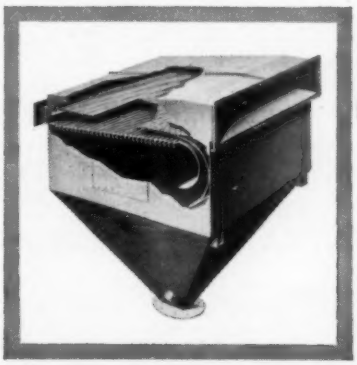
How a Buell Collection System "gangs-up" on dust to meet the toughest air pollution codes


Exclusive Spiralectrodes consistently send out more negative ions
Negative ions "gang up" on dust particles
Dust particles attracted to collecting plates
+



Buell Cyclones also deliver extra collection efficiency to "gang-up" on dust: Exclusive Shave-off design harnesses double-eddy current and puts it to work.

With positive gas flow control for peak efficiency . . . plus continuous cycle rapping to eliminate puffing . . . Buell's "SF" Electric Precipitator really "gangs-up" on dust (even dust with high resistivity) to permit full production even under the most rigid anti-air-pollution codes.



Buell's Low Resistance Fly Ash Collector combines high efficiency to meet present day strictness, with low draft loss for natural or mechanical draft installations.

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Buell Engineering Company
Dept. 14-H, 70 Pine Street
New York 5, New York

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For more facts circle 632 on Reply Card

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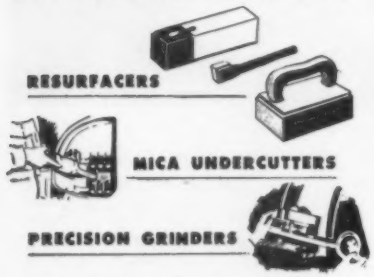

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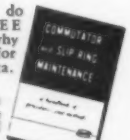

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DATA FILE

(Begins on page 192)

in vertical and horizontal delivery and power-throw types. Covers design features and provides performance and capacity data. Also provides information on unit heater selection, sound ratings, locating unit heaters, motor wiring and control. Piping and installation suggestions are included as well as typical unit heater specifications. Modine Mfg. Co.

340 **Gas Heating Equipment**—Comprehensive Catalog GN-56, 24 pp, presents suspended gas unit heaters, both fan and blower types, in capacities from 25,000 to 250,000 Btu; a deluxe suspended unit heater; a floor model; duct furnaces; and a horizontal furnace. In addition to specifications, construction details and dimensions, drawings and tables, catalog also provides installation information and application ideas. Reznor Mfg. Co.

341 **On Unit Heaters**—Latest improvements, specifications and performance data for Hermen Nelson horizontal and vertical unit heaters are covered in 36-pp Bulletin 700A. Includes complete hot water and steam performance tables, dimensions, selections, applications, descriptions of cabinets, elements, motor mountings, fans and accessories, controls. Also provided are suggested layouts, piping diagrams, other data. American Air Filter Co., Inc.

342 **Revolving Unit Heaters** — Bulletin HR-64, 16-pp, features revolving unit heaters for industrial plant heating, presenting design and construction details and showing typical installations. Engineering data, mounting heights and coverage, and dimensions are tabulated, and dimension drawings are included, along with installation planning tips and specifications. L. J. Wing Mfg. Co.

343 **Industrial Ovens** — Thirteen types of company's Conventioneered ovens, which apply principles of forced convection heating to various industrial processes, are illustrated and described in 12-pp Bulletin 200. These ovens serve foundries, metal finishers, plastics producers. The W. W. Sly Mfg. Co.

344 **Hot Water Heating Systems**—Catalog GK-954, 24 pp, features a complete line of equipment for forced hot water heating systems and chilled water cooling systems. Nine pages are devoted to information on a complete line of circulating pumps for dozens of applications. All-bronze pumps for circulating service water and silent operating centrifugal pumps for boosting water pressure are a few of the new applications. Valves, fittings, air vents, air tanks are also described. Bell & Gossett Co.

345 **Industrial Ovens** — Engineering, manufacturing and installation of processing ovens are described in Bulletin D-53-20, 16 pp. Covers oven types, application to industry source of heat, selection of heater, control of heat, distribution of heat. Photos show typical oven installations, and a complete modern finishing process is presented. Newcomb-Detroit Co.

BOILERS, GENERATORS

346 **Packaged Boilers**—This 16-pp illustrated catalog describes manufacturer's new Type VP Package boiler. Following a section of background information is an outline of principal design features of these boilers, which are shop assembled and provide steam capacities from 4000 to 40,000 lb per hour. Space requirements are shown in a table along with specifications. Combustion Engineering, Inc.

348 **Packaged Generators**—This 16-pp catalog covers a new series of packaged steam generators in sizes from 10,000 to 46,000 lb of steam per hour. Gives capacities, dimensions, construction features. Instrumentation is discussed. Illustrations include sectional drawings and installation photos. Booklet also provides a selection chart on firing equipment and controls. Foster Wheeler Corp.

349 **Package Boilers**—This 12-pp booklet on package steam generators describes the formulas behind all package steam generators, and illustrates how installation of a package steam generator can raise steam capacity in an existing boiler room without extensive structural changes. Shows plant operators how to make survey of their own steam requirements. Cyclotherm Div., National-U. S. Radiator Corp.

350 **Automatic Boilers**—Advantages of company's packaged automatic boilers for light oil, heavy oil, gas or combination gas-oil firing are outlined in Bulletin 1220. Describes two models, and includes ratings, dimensions and weights, as well as installation photos. Orr & Sembower, Inc.

351 **Automatic Boilers**—Bulletin BE-4 describes operation and advantages of Continental automatic boiler's spinning gas technique—a method of obtaining maximum heat transfer with a simplified design. Shows cutaway view of boiler construction; illustrates hinged doors and method of injecting air through static, turbine-like vanes into burner. Boiler Engineering & Supply Co., Inc.

VALVES, TRAPS, PIPING AND ACCESSORIES

353 **Bronze Valves**—Globe and angle bronze valves with rising stems, union bonnets and stainless steel plug type seats and discs are described in this bulletin. Discusses design advantages, gives dimensions. The Walworth Co.

354 **Diaphragm Valves**—Catalog V-55, 34-pp, covers operation, installation and selection of diaphragm valves for handling of acids, alkalis, gases, volatile and viscous substances, water and other fluids, compressed air, vacuum, slurries, semi-solids, beverages and food products. Diaphragm materials are described, selection tables included. Hills-McCanna Co.

355 **Lubricated Plug Valves**—Catalog PV-4, 36-pp, shows in detail a line of iron and steel lubricated plug valves. Many illustrations of single, screwed and bolted gland type valves are shown, including photos, sectional and detailed drawings. Also included is physical data on dimensions, ratings. The Wm. Powell Co.

The two Reader Service Cards on pages 187-188 are easy to use and need no postage. Just circle the item number on catalogs wanted.

356 **For Quick Valve Selection** — Here's a 20-pp catalog digest providing ordering and application information on gate, globe, angle and check valves in bronze, iron, cast and forged steel construction, also valve accessories and parts. Illustrated, includes pressure-temperature chart. The Ohio Injector Co.

357 **Plug Type Valves**—Bronze plug type valves with 500 Brinell armor seat are illustrated and described in this 6-pp brochure, Form 202. Includes photos of various models, full specifications, as well as a cutaway view showing outstanding features. Jenkins Bros.

358 **Reducing Valve Engineering Data**—Bulletin 962 explains how the contour of a pressure reducing valve contributes to efficiency of performance. Discusses straightline flow, tight closing. A. W. Cash Co.

359 **Valve Performance Facts**—Included in this 36-pp booklet are 32 case histories of cost-saving valve installations. Service applications covered include steam, oil, water, coating fluid, chlorine, phenol, pulp stock, vacuum, others. Industries include paper mills, refineries, central stations, other plants. Crane Co.

360 **Steam, Air and Gasoline Traps**—Catalog 751, 32 pp, is a trap ordering book with capacity tables, installation diagrams, and containing charts and formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps, weight-operated traps for steam, air, gasoline, pressure up to 1500 lb. W. H. Nicholson & Co.

362 **Steam Trap Book**—Catalog J is a 44-pp manual and ordering guide in which 17 pp are devoted to data on fundamentals on good trapping and trap selection. Installation and maintenance instructions are also provided. Book lists steam traps for maximum pressures of 250, 600, 900, 1500 and 2500 psig. Included, also, is a section on trouble shooting. Armstrong Machine Works.

Hall Industrial Water Report

VOLUME 4 AUGUST 1956 NUMBER 4

Scale or Sludge Deposits Can Crop Up Most Anywhere Water is Used

When they do, the water detective must find the cause and the cure. Sometimes the problem is run-of-mine. More often, however, it brings into play his skill and experience as a specialist in dealing with water.

Cold Niagara Revealed as Offender

As winter cold deepened, a chemical manufacturing plant on the Niagara River, a Hall client for many years, suddenly experienced a hard glassy deposit in the plant intake and distribution system. Pumps had to be removed from service for cleaning. Mechanical cleaning had no effect, but when the pumps were heated with steam the deposit softened and washed out.

G. H. Smith and R. E. Elliott, Hall engineers in the Buffalo office, found that the Niagara River water at the plant intake showed greater than normal values for calcium, alkalinity and pH, indicating contamination by an alkaline calcium-bearing material. However, this information did not explain the fact that calcium carbonate was being deposited in the cold sections of the system rather than at points where the water was being heated.

Elliott called J. P. Kleber at the home office in Pittsburgh for an opinion. From past experience, Kleber had the answer immediately. Hexahydrate of calcium carbonate! —a quite uncommon material. Temperatures below 40F plus some free hydroxide alkalinity in Niagara River water had precipitated this compound. When the temperature was elevated, the material lost its water of hydration and left a relatively soft calcium carbonate mud.

How to prevent the deposit? Nothing could be done about the contamination or the winter temperature of the incoming water. While treatment of this water with 5 ppm of Calgon® would keep the scale from forming, in-plant changes appeared to be less costly than chemical conditioning. Well-pleased with the diagnosis and suggestions, the plant went ahead with these changes.

Desuperheater Develops Deposit

At a lumber plant in Oregon a low-pressure turbine using desuperheated steam suffered a substantial decrease in capacity. Inspection of the desuperheater and the steam line beyond it revealed the presence of deposits an inch thick.

R. T. Manion, Hall field engineer in Portland, uncovered the fact that during the night there was insufficient condensate for desuperheating, so raw water was being used to supplement it. Evaporation of this raw water deposited the solids it contained in the desuperheater, steam lines and turbine.

Further investigation produced a practical answer to the problem. During the day there was more condensate than required for desuperheating, so Manion recommended storing the excess for use at night. Now the plant has sufficient condensate for desuperheating at all times. As a result, turbine capacity remains constant and the former difficulties with valves, strainers and traps are no longer experienced. A recent inspection of the desuperheater showed it to be clean.

Midwest Power Co-operative Eliminates Manual Cleaning Of Preheater Trays

Hand chipping of hard, white scale from their evaporator preheater trays was a time-consuming monthly task at a midwest power co-operative. J. F. Nelson, Hall field engineer in Kansas City, suggested changes in points of chemical feed ahead of the preheater in order to obtain good mixing of the conditioning chemicals before the water reached the preheater. He further recommended the feeding of 5 ppm of Hagan Dispersive®.

Since the start of dispersive feed a 30 percent increase in evaporator capacity has been noted because of cleaner heat transfer surfaces. Also when the preheater trays were cleaned after three months' operation the deposit found was so soft it could be removed with the fingers. Further changes have been recommended which should result in even greater improvement in conditions.

Hospital Reports Condition Of Boilers Excellent

When a hospital on Long Island, New York, decided to increase steam generating capacity, Hall Laboratories was invited to provide water conditioning service for the expanded boiler plant.

Hall field engineer R. A. Beardsley found that the old boilers contained a considerable amount of scale difficult to remove by mechanical cleaning even though the make-up water had been zeolite softened and phosphate and soda ash had been used for internal conditioning. Serious tube difficulties had been averted simply because the boilers had been operated at very low ratings.

After three years of cooperative effort with Beardsley, the Chief Engineer at the Hospital reports, "The new boilers are free of scale and corrosion. The scale has been removed from the old boilers and it is now possible to operate during the off-heating season with only one boiler at greatly increased fuel efficiency."

Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems. For information write, wire or call Hall Laboratories, Inc., Hagan Building, Pittsburgh 30, Pa.

Water is your industry's most important raw material. Use it wisely.

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For more facts circle 635 on Reply Card

DATA FILE

(Begins on page 192)

364 **Aluminum Pipe and Fittings** — Aluminum pipe—for conveying everything from air to acid—is described in this 18-pp Form AD197. Booklet presents characteristics and advantages for each major field of application. Specifications are provided, along with a description of appropriate fittings and methods of installation. Describes process industry applications and advantages. Similar treatment is accorded other fields, including pipelines, portable piping, and structural piping. Aluminum Co. of America.

365 **PVC Pipe Fittings, Flanges**—This is a comprehensive 12-pp catalog on corrosion resistant pipe fittings and flanges in normal- and high-impact grades, rigid, unplasticized polyvinyl chloride. Shows characteristics, advantages and limitations. Lists operating pressures, temperatures, applications, price comparisons, fabrication advice, installation and supporting recommendations, dimensions and weights. Grinnell Co., Inc.

366 **Glass Pipe and Fittings**—Corrosion-resistant qualities of this Pyrex brand glass pipe and fittings which make it suitable for use under corrosive conditions are described in 18-pp Bulletin EA 3. Operating temperatures, physical characteristics, installation procedures are covered and specifications and dimensional drawings are included. Corning Glass Works.

367 **Pipe for Modern Buildings**—This 16-pp booklet discusses wrought iron pipe for modern buildings. Identifies wrought iron pipe and describes composition and advantages. Included are sections on wrought iron's resistance to corrosion and fatigue stresses, weldability, forming and threading, as well as the application of protective coatings to the material. Pictures illustrate applications. A. M. Byers Co.

368 **Improved Hose Coupling**—A quick connect-disconnect hose coupling for water, oil, steam, gas and chemical lines is described in this 16-pp bulletin. Describes the coupling's construction and explains how it provides a sealing action which makes the coupling tighter as internal pressure increases, and a full swiveling action that prevents hose twisting and kinking. Titeflex, Inc.

369 **Welding Fittings**—When and where to use company's Weldolet welding fittings is told in 38-pp Bulletin W-4. Includes tables listing sizes, dimensions, weight, and price, as well as dimensional drawings. Installation procedure is fully described and specifications, graphs providing reinforcing information, and photos of typical applications are also included. Bonney Forge & Tool Works.

INSTRUMENTS, CONTROLS

370 **Automatic Controls — Mercury-switch** equipped controls for heating, refrigeration, air conditioning and other industrial uses are presented in 52-pp Catalog 856. Fully illustrated, book provides ordering and application information on a variety of pressure controls, temperature controls, level controls, limit and fan controls, and many others. Also presents data on relays, and on tilting-type and magnet-operated mercury switches. The Mercoid Corp.

371 **Versatile Electronics**—How flexibility of electronic temperature controls makes them useful in a wide range of heating and air conditioning installations is explained in this 16-pp booklet, Bulletin SA-2681. Purpose of publication is to fill the gap between the theory of electronic bridge circuits and specific control layouts and circuit diagrams. Four basic features that give electronic control its flexibility and application to a wide variety of installations are described. Minneapolis-Honeywell Regulator Co.

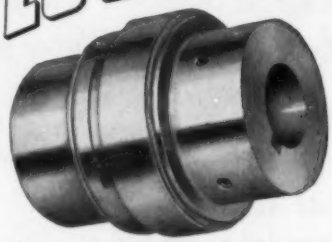
372 **Service Regulators** — Revised Bulletin 1026, 20-pp features company's line of service regulators. Rate-of-flow graphs illustrate mathematically the determination of maximum outlet pressure build-up and amount of gas relieved to atmosphere by extra safety device in case of failure of regulator. Rockwell Mfg. Co.

374 **Overheat Protection**—Bulletin MOPR-1, 8 pp, describes design and operation features of inherent overheat protectors—small devices

15 YEARS SERVICE WITH ONE SET OF CUSHIONS

... actual report on

LOVEJOY



Flexible Couplings

Up to fifteen years maintenance-free service is not unusual with Lovejoy lubrication-free flexible couplings.

Performance like this is practical proof of these soundly engineered features:

SIMPLE, RUGGED CONSTRUCTION
Fewer parts. No intricate mechanisms. Nothing to lubricate.

LOAD TRANSMITTED BY CUSHION COMPRESSION
No wear on the metal jaws.

DOUBLE-LIFE CUSHIONS
One half of the cushions act as idlers—except on reversible loads. A quick interchange provides a new set of cushions. This can be done without dismantling the coupling.

Illustration at right shows a Lovejoy Type CF flange-mounted coupling. Rated at 160 hp., 800 rpm., this space saver connects drive shaft between diesel power unit and generator.

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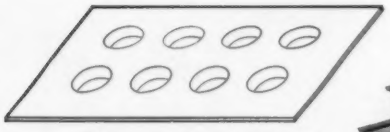
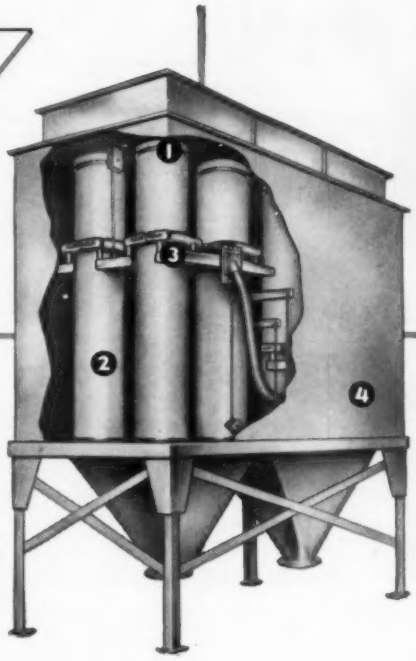
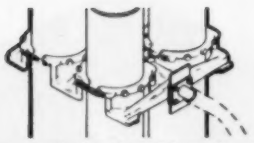


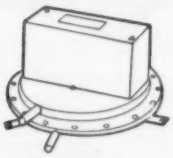
1 Air enters plenum casing at top of Series 12 Aeroturn for equal distribution to all filter bags. Bags are of felt . . . with higher filtering efficiency than woven material. Tiny pores hold even submicronsized dust particles. Cloth area is less than ⅛ that of shaker bags.

2 The air travels downward through the filter bags, assists delivery of dust into hoppers below... escapes through bag walls. Even distribution of dust puts every square inch of the filtering surface to work... avoids clogging... permits air to escape easily.





3 Self-adjusting blow rings* travel length of filter bag exterior . . . discharge reverse-air-jet into bag which blows accumulated dust off bag walls. Cleaning never interferes with filtering... which maintains peak efficiency. Aeroturn remains on the job continuously.



4 Automatic pressure switch* controls blow ring operation. Above normal pressure loss automatically actuates blow rings. When pressure loss normalizes, blow rings stop operation. Self-cleaning occurs as often or as little as needed . . . avoids over-cleaning.

Up to 75% Lower Installation Costs—99.9%+ Efficiency with KOPPERS Series 12 Aeroturn Dust Collectors!

Factory-assembled and test-operated, Koppers Model D Aeroturn Dust Collector combines features of Series 12 with unusual compactness. Capacities range from 500 to 4,800 CFM.

50% Lower Maintenance Costs . . . Up to 50% Less Space!

Aeroturn's remarkably high filtering efficiency slashes your plant and machinery maintenance costs further than can any other dust collector. Heating and cooling costs tumble because air can be recirculated . . . cleaner than outside air. Employee and community relations are improved. Yet Koppers Series 12 Aeroturn costs you less to install . . . less to maintain. Space requirements are far smaller.

Operation is continuous and automatic . . . without a drop in peak efficiency due to cleaning. Pre-fabricated Koppers Series 12 Aeroturn ranges in capacity from 1,000 to 60,000 CFM . . . contains from 4 to 64 filter bags each 12″ in diameter and up to 18′ in length.

It takes only a few minutes of your time to discover how Koppers Series 12 Aeroturn may save you thousands of dollars.

AEROTURN DUST COLLECTORS

KOPPERS®

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Metal Products Division
Industrial Gas Cleaning Dept.

***Engineered* Products**
Sold with *Service*

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KOPPERS COMPANY, INC., Industrial Gas Cleaning Dept., 5108 Scott Street, Baltimore 3, Maryland.

Gentlemen: Please send me a free copy of your Aeroturn booklet with descriptions, drawings and photographs. ☐ Series 12 ☐ Model D

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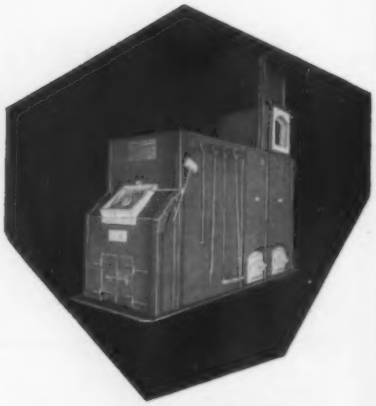

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Chicago 13, Illinois

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DATA FILE

(Begins on page 192)

built into electric motors to turn power off when windings get too hot. Includes photos and wiring diagrams illustrating operation. Metals & Controls Corp.

375 Sound Measurement—Form 797-C, 12-pp, outlines the many applications of sound and vibration measuring instruments and describes several models of sound level meters designed for measuring intensity of sound and analyzing its various frequency components. Includes specifications and full descriptions of the models, along with photos of the instruments in use and data on various accessories. General Radio Co.

376 Combustion Controls—Included in this catalog (about 16 pp) are product descriptions of company's combustion instruments and controls. Covers damper controls; drive units; draft, air pressure and flue temperature gages; steam controls; panel board cabinets; low-draft cut-off switches. Pages are fully illustrated to show design and operational details, and brief text includes application suggestions, special features. An oil burning manual of information is included with this catalog. Cleveland Fuel Equipment Co.

LUBRICANTS, LUBRICATION

377 Centralized Lubrication — Pocket-sized 24-pp, Form 34-22, called "Ask Anyone in Industry" describes in comic-book form the hazards and inefficiency inherent in conventional lubrication practice and promotes use of centralized lubrication — in the form of Alemite Accumeter measuring fittings. Shows how these are connected by tubing to a lubrication pump which is controlled by a timer. Alemite Div., Stewart-Warner Corp.

379 "Fringe Area" Lubrication — Revised Bulletin 103A lists 17 types of molybdenum disulfide lubricants and features an explanation, with diagrams, of applications in extreme bearing pressure, and high, low and normal temperature lubrication. Five new lubricants are included. A selector chart describes each type, kind of carrier used in it, temperature range in which it operates best, and method of application. The Alpha Molykote Corp.

380 Multi-Purpose Grease — This bulletin describes Gargoyle Grease BRB No. 1, intended to provide correct lubrication for practically all normally loaded anti-friction and plain bearings. Tells how it resists leakage, affords protection. Socony Motor Oil Co., Inc.

CONSTRUCTION

381 How to Glaze with Plexiglas—Sixteen-pp Booklet PL-23 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems. Gives properties and behavior of this sheet. Plastic Dept., Rohm & Haas Co.

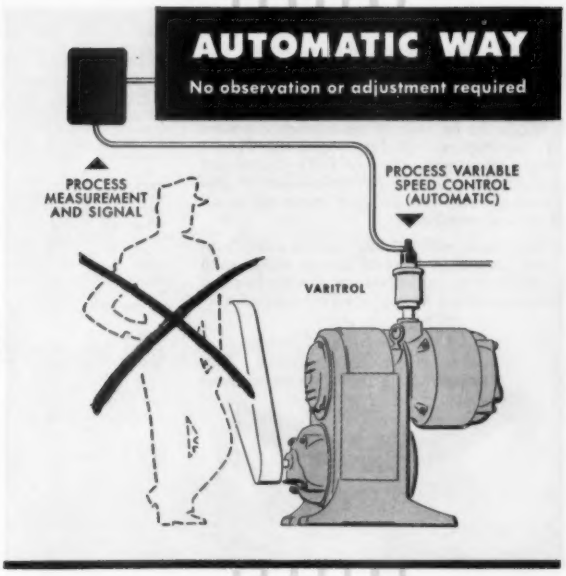
382 Panel Wall Construction—The advantages of company's M-Type Q-Panel walls are outlined in 12-pp Bulletin Q-35-55. Includes installation photos, diagrams, specifications, as well as drawings pointing out structural details. H. H. Robertson Co.

383 Glass for Industrial Use—How glass is used and how to choose the proper type for the application are covered in 12-pp Catalog 56-1. Discusses glass according to function; light diffusion and glare reduction; decoration; protection; and heat absorption. Photos showing various finishes and typical installations are provided, along with performance data, selection and installation tips, light transmission ratings and other data. General advantages offered by company's line of glass are also detailed. Mississippi Glass Co.

384 Glass Blocks—This 24-pp catalog describes company's glass block and its functions, and lists various glass block patterns manufactured, including light and solar heat controlling blocks, with details on functional advantages of each specific pattern. Included are instructions and construction details for both

For more facts circle 639 on Reply Card

HOW VARITROL AUTOMATIC SPEED CONTROL saves Manpower



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Now, by controlling speed with Varitrol as a component of the U.S. Varidrive motor, speeds can be *automatically* changed in response to a signal *without* human attention. Varitrol pneumatic control regulates the speed of Varidrives in response to a signal from such variables as temperature, humidity, pressure, speed, liquid level, weight and tension. Varitrol automatic control of Varidrives offers an opportunity for improved quality of product, greater uniformity and more efficiency in plant flow handling. A profusely illustrated multi-color booklet explaining in detail the construction and operation of Varitrol automatic control is available. Write today for your copy.

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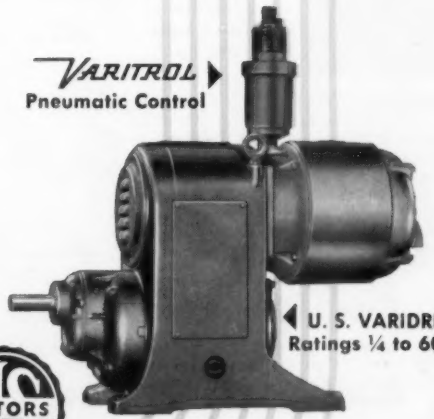

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A satisfied customer writes about Joy

LIMBEROLLER

Belt Conveyor Idlers:

"Early in 1955 we decided to try four Joy Limberollers on the No. 1 slope conveyor from the primary gyratory crusher in the quarry.

"This conveyor carries the product of the primary crusher set at about 5', on a 12 degree slope and running at about 450 feet per minute. Originally designed for 400 ton per hour capacity; there have been surge loadings of twice this amount.

"While the balance of the conveyor system is the enclosed gallery type; the No. 1 slope conveyor was not fully completed before the start of production season and consequently ran all year exposed to all kinds of weather.

"The Limberollers have carried a few hundred thousand tons of heavy stone with absolutely no maintenance. On the basis of this record we have placed repeat orders."

Richard Robinson

Richard Robinson, Treasurer
MASSACHUSETTS BROKEN STONE COMPANY

LIMBEROLLERS, at work on conveyor at Massachusetts Broken Stone Company.

The Joy Limberoller resists dust, abrasion, corrosion and material buildup. Resilient discs on a flexible steel cable conform to load and cushion the belt. Only two bearings are used and these are up out of the dirt zone. Get details from *Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.* In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

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DATA FILE

(Begins on page 192)

large and small-size panel installations in steel, wood frame, brick or brick veneer construction. Table of dimensions; a section on how to calculate illumination and brightness; and tables on solar heat control and fuel savings included. Owens-Illinois Glass Co.

385 Window Modernization—How to modernize old windows with company's glass blocks is told in 8-pp Bulletin GB-104. Selection data is included, along with photos of typical installations. Pittsburgh Corning Corp.

387 For Stairway Construction—This 12-pp illustrated booklet describes the use of this company's Junior channels in stairway construction. Provides specifications and shows some of the buildings in which the channels have been used as stair stringers. Tables give size and weights, and show allowable loads. Jones & Laughlin Steel Corp.

388 Non-Slip Flooring—Algrip, an abrasive rolled steel floor plate described as non-slip even on steep inclines, is the subject of Booklet AL-29, 8 pp. Discusses safety features; gives fabricating data. Alan Wood Steel Co.

390 Metal Grating Handbook — Sixteen-pp Form 500 is data and specification manual covering all types of grating, open steel floor armor, stair treads, vessel liners, decking and drain grates. Contains safe load tables for basic types of gratings, panel width constant charts, tables on standard widths and types of steel treads, types of anchors used for grating. Klemp Metal Grating Corp.

391 Steel Floor Plate—Skid resistance and other advantages of multigrip rolled steel floor plate are stressed in this illustrated bulletin. Also gives dimensions, weights, data on allowable loads. Typical uses of the floor plate are pictured. United States Steel Corp.

392 Corrosion - Proof Materials — Bulletin CC-3, 16-pp, gives basic information on company's corrosion proof construction materials, covering chemical and physical data, estimating data and descriptions of products used for acid proof installations in the metal working, chemical, petroleum, pulp and paper and other industries. Included are sections on corrosion proof cements, tank linings, protective coatings, rigid plastic fabrications and rigid plastic pipe, plus a chart showing their resistance to chemicals. The Atlas Mineral Products Co.

393 Air Tools, Paving Breakers—These two bulletins describe company's latest models of paving breakers and air tools for plant construction and maintenance work. Bulletin PB1 gives features and specifications on heavy-duty, medium-weight and lightweight paving breakers, as well as tools for use with them. Bulletin ST-100 describes and gives specifications for clay spaders, trench diggers and backfill tampers. Gardner-Denver Co.

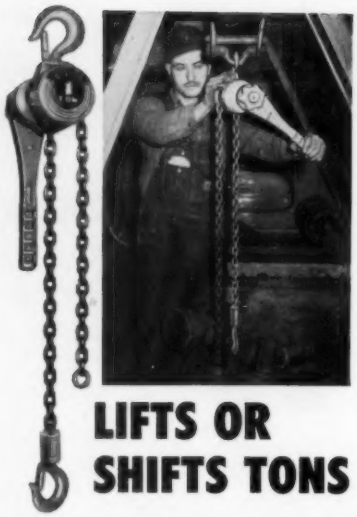
STORAGE EQUIPMENT

394 Storage Equipment — Catalog 100-E, 72-pp, illustrates and describes company's complete line of steel cabinets, folding chairs, chests and safes, stools, tool boxes, work benches, tool stands, shelving, tool storage, lockers, coat racks, filing cabinets, revolving bins, others. Includes dimensions and other specifications. Photos illustrate some typical equipment installations. Lyon Metal Products, Inc.

395 Adjustable Shelving—How this shelving can save assembly time is explained in 28-pp Form 2111. Photos and drawings of various types of shelving units, including open and closed shelving, bin units, ledge shelving, counter shelving, cabinets with swinging and sliding doors, parts and accessories are included, along with specifications. Standard Pressed Steel Co.

MAINTENANCE

397 Basic-Roofing Information—"What You Should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended



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'Tugit' is small and light, but powerful and versatile. With it you can easily lift or pull loads straight up, across or at any other angle. It saves time and energy. Only 40 lbs. of muscle effort on the non-kicking handle moves a 1-ton load. The powerful brake acts automatically, so lowering is safe, spotting is accurate.

Maintenance men keep the portable 'Tugit' in their tool boxes for emergencies. Construction crews use it for laying pipe, erecting scaffolding — thousands of other jobs. Try 'Tugit' yourself. It is made in 1 and 2-ton sizes. *Ask your "Shaw-Box" Distributor for details or send for Bulletin 388.*

'Tugit' HOISTS

MANNING, MAXWELL & MOORE, INC.
MUSKEGON, MICHIGAN

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Makers of 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

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WHAT ARE YOU LOOKING FOR IN A UNIT HEATER?

Top performance? Quiet operation? Easy installation? Low cost? They're *all* yours when you choose from the American Blower Venturafin Unit Heater line. It is a *complete* line, available in all popular sizes, with capacities ranging from 18,000 to 560,000 BTU (at 2 lbs. steam pressure, and 60° entering air).

You'll find a choice of coils to fit your particular job requirements, too. Coils are available for use with high-temperature, high-pressure hot water; with low-pressure hot water; or with steam. All coils have high-quality non-ferrous fins, mechanically bonded to seamless copper (or steel) tubes for efficiency and durability.

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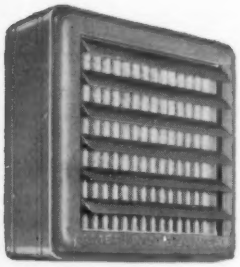
There's an American Blower Unit Heater for every job



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For horizontal blow, select from a wide range of capacities: 18,000 to 357,500 BTU at 2 lbs. steam pressure and 60° entering air.

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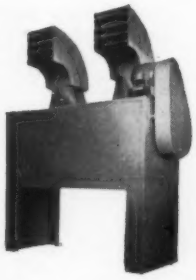
Equipped with exclusive ABC Equitemp Air Diffusers. Capacities: 58,400 to 560,000 BTU at 2 lbs. steam pressure and 60° entering air.

GAS-FIRED HEATERS

Available for natural, mixed, manufactured, LP, LP air gas mixtures, and dual fuel arrangements. Sizes and capacities to fit your needs.



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High-velocity type industrial space heating. Seven sizes. Capacities from 79,000 to 1,630,000 BTU per hour. Certified Ratings.

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AMERICAN BLOWER

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DATA FILE

(Begins on page 192)

roofing practices, essentials of a good re-roofing job, also special features of company's roofing materials. Johns-Manville.

399 Building Maintenance — Handbook 7 offers 64 pp of information on floor surfacing, leak stoppers, external wall sealants, roadpatching, roofing materials. Includes instruction for applying them. Flexrock Co.

400 Hot-Dip Galvanizing—How hot-dip galvanizing is prolonging life of industrial equipment is stressed in this 16-pp booklet. Photos, showing galvanized equipment in use accompany brief text explaining how this process of covering iron and steel with a protective coating of zinc serves to prevent rust. The galvanizing procedure is explained and illustrated. Coating comparison charts show how hot-dip galvanizing compares with other types of coatings as to rust resistance, dimension limits, shock resistance. American Hot-Dip Galvanizers Assn., Inc.

401 On Rust Prevention—This 1956 General Catalog, 28-pp Form 255, presents a treatise on rust prevention with illustrations of Rust-Oleum uses and applications throughout industry. Included are 102 color chips showing variety of colors available in primers, short oil type coatings, oil field finishes, restful color group finishes, machinery and implement colors, long oil type coatings, calvinoleum coatings, heat resistant coatings, chemical resistant coatings. Rust-Oleum Corp.

402 Protective Paint—Thirty-five case histories of successful use of protective coatings based on chlorinated rubber are included in this 20-pp bulletin, "Protection With Parlon." Photos show water and sewage works, paper mills, storage tanks, and chemical and food processing plants where these coatings have had long-term exposure to corrosive environments. Includes performance data, instructions for application. Hercules Powder Co.

403 Insulation Coating—This 32-pp illustrated handbook, Form L-17, presents the advantages of company's NoDrip insulation coating for preventing condensation drip from metal, concrete, brick, wood, plaster or composition surfaces. Lists applications and describes methods of applying. Contains tabulated data on quantity required to cover various size tanks and pipe. J. W. Mortell Co.

404 Coatings for Insulation — Manual 545, 20 pp, is a revised reference manual on adhesives, sealers, vapor barriers, surface coatings for use with insulation. Gives technical product data, application specifications. Includes handy reference chart covering 31 products, giving information on uses, application, and drying time. Benjamin Foster Co.

405 Repairing Concrete Floors — A seven-step procedure for repairing concrete floors with non-shrink mortar is described in this folder, EPMM-4. Each step is illustrated with an actual photo and description of step involved. Strength comparisons between plain mortar and non-shrink pre-mixed mortar are given. The Master Builders Co.

406 For Fast Floor Repairing — This illustrated bulletin covers Kwik-Roc, a fast and tough hardening material for repairing holes and cracks in concrete floors. Tells how to prepare surfaces for Kwik-Roc, how to mix, place, and store it. Includes service recommendations. A. C. Horn Co., Inc.

407 Better Floor Care — This illustrated folder describes products designed to aid efficient floor care. Lists combination Scrubber-Vac machines, conventional scrubbing-polishing machines, steel-wool pads, applicators, vacuum cleaners, mop trucks and other mopping equipment. Included are waxes, sealers and cleansers. Finnell Systems, Inc.

408 Industrial Vacuum Cleaning — Twelve-pp Bulletin 155 B describes both stationary vacuum cleaning equipment and portable industrial vacuum cleaners, the latter in both light- and heavy-duty types. Recent improvements in collection and dumping methods are covered, and photos show application to conveying, reclaiming, bench work and removal of water. Specifications and ratings are included. Spencer Turbine Co.

409 Brushless Suction Sweeper—Dust control features and advantages of using company's floor-type vacuum for large floor areas are presented in this illustrated bulletin. Describes operation, points out typical applications and includes dimensions and specifications. Handling Devices Co., Inc.

410 Off-the-Ground Maintenance — Bulletin G205R, 8 pp, discusses the subject of controlling costs when maintenance goes above arm's reach. Describes trestles, swinging scaffolds, aluminum scaffolds, ladder scaffolds, step ladders, extension ladders, storage racks and other equipment designed to handle every type of overhead maintenance problem. Pictures applications. The Patent Scaffolding Co., Inc.

DUST CONTROL AND AIR CONDITIONING

411 Dust Control, Blast Cleaning—Bulletin 1210, 24 pp, fully illustrated, describes manufacturer's line of blast cleaning and dust control equipment, accessories. It is indexed according to equipment, type and purpose. Lists three methods of application. Pangborn Corp.

412 Dust Control — "Engineered Efficiency in Dust Collection and Recovery," 36 pp, discusses industrial dust recovery from standpoint of nuisance abatement, waste avoidance, hazard elimination. Shows effect of variation in particle size, distribution and specific gravity of dust on efficiency of the dust collecting system. Buell Engineering Co., Inc.

413 Flexible Hose—A set of five bulletins (Nos. 40 through 44) are of interest to plant engineers concerned with the design, installation or purchase of flexible hose for dust and fume control, air conditioning and materials handling. They provide general information, data on installation, application suggestions, technical data and prices on hose, duct and accessories. The Flexaust Co.

415 Air Conditioning Filters—Bulletin 600, 8 pp, describes company's Staynew ventilation and air conditioning filters. Specifications, engineering, performance and installation data covering dry type panel filters for the removal of air-borne impurities given. Dollinger Corp.

VIBRATION CONTROL

416 How to Cut Vibration — The use of Vibra-Mount felt in reducing machine vibration and accompanying noise is covered in this 20-pp illustrated booklet. Tells where this shock-absorbing felt is used effectively, how to select the proper mount, and how to install it. Cost information is provided, other felt products are listed. American Felt Co.

418 Vinyl Machine Mount — Advantages of company's vinyl machinery mount are outlined in this illustrated brochure. Installations in a representative plant are shown. Clark, Cutler, McDermott Co.

419 Vibration, Noise Control—Bulletin K6A, designed as a plant engineer's guide to machinery mounting, vibration and noise control, discusses such problems as: machine mobility, eliminating floor bolts; leveling machines; eliminating rejects. Shows by means of case histories how these problems are solved by such isolation media as steel springs, cork, and rubber. An insert section features selector chart telling cost of mountings for 215 commonly used open back inclinable punch presses. The Korfund Co., Inc.

420 Machine Mountings—Bulletin 415 features Isomode pads, low cost machine mountings designed to simplify machine installation, control vibration, reduce noise, and absorb impact. Tells how to install these mountings and illustrates some typical installations. Price information is included. MB Mfg. Co., Inc.

MATERIALS HANDLING

421 Cranes for Big Jobs—A new 1½-yard shovel, 35-ton crane is described in this 6-pp catalog. Action pictures of the machine in quarries and gravel plants are included, also specifications. American Hoist & Derrick Co.

422 Electric Hoists—Twelve-pp Bulletin DH 133B describes Speedway electric hoists of 500-to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conducting systems. Clearance data, specifications included. Wright Hoist Div., American Chain & Cable Co., Inc.

423 Electric Hoist Manual—Catalog 215-B offers 38 pp of engineering, application and ordering information on company's Load-Lifter electric hoists. Presents hoists with hand operated trolleys and with power travel, hoists with lug suspension, hook suspension and push-type trolleys, and with hand-geared trolleys. Manning, Maxwell & Moore, Inc.

424 Manual on Electric Hoists — Catalog H-46, 40 pp, covers monorail and stationary hoists and car pulleys. Explains fundamental types of grabs, methods of hanging I-beams, types of hoist suspension, controls. American Engineering Co.

425 How to Choose a Crane—Designed to aid in the selection of overhead cranes, 8-pp Unit 79 shows how to analyze handling problems, decide on the type of crane desired and draw up specifications for crane proposals. Basic data is provided on classes of crane service, crane ratings and capacities and recommended speeds for bridge, trolley and hoist, along with standard dimensions and clearances. Gives 14 safety features. Whiting Corp.

426 Transit Crane—Twelve-pp Bulletin 15-B-TC-1 describes a transit crane of 15-ton capacity. Illustrated by job application photos and closeups of mechanical features, the booklet includes a list of specifications and working ranges, plus brief, easy-to-read description of the machines, advantages. Bucyrus-Erie Co.

427 Overhead Handling System—Engineering and application data on overhead handling equipment is presented in 12-pp Bulletin 2008-L. Describes stresses developed in various type tracks used for overhead handling systems. Problem of track peening and its solution is also covered. Data is given on principal components of system. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

To order these catalogs circle item numbers on the handy Reader Service Cards provided on pages 187-188.

428 Overhead Cranes—Bulletin T202, 20 pp, gives full information on top running double girder cranes with top running trolley in capacities from 2 to 12 tons, spans to 60 ft. Data is also given on top running single girder cranes, both motor driven bridge types and head geared or push type in capacities from 1 to 10 tons, spans to 50 ft. Features which contribute to efficient operation and low maintenance costs are detailed. Electrical information included. Chicago Tramrail Corp.

429 Continuous Power Conveyor — Sixteen-pp Catalog A-96 describes a packaged overhead conveyor for light duty applications. This complete basic "package" contains drive unit, take-up, oiler and other items essential for a 50-ft system. Describes power drive unit, track, power chain and other components and discusses lubrication and chain safeguards. Suggested layouts are diagrammed, and some installations shown. Richards-Wilcox Mfg. Co.

430 Power and Free Conveyors — Catalog 52, 80 pp, describes important features of a power and free conveyor system and illustrates component parts. Includes data on trolleys, rivetless chain, single and compound vertical curves, switches, caterpillar drives, roller curve takeups, inspection and lubrication gates, carriers, load bars, bumpers, automatic stops and feeders, others. Dimensions and standard assemblies are shown on diagrams and typical applications pointed out. Jervis B. Webb Co.

431 Engineered Conveyor Systems—Catalog 853, 32 pp, illustrates conveyor systems in use in a wide range of industries, showing how they suit handling requirements involved. Roller, wheel, belt, chain, overhead trolley and elevating conveyors are included, also spirals, portable power conveyors, ball transfers and special equipment. Mathews Conveyor Co.

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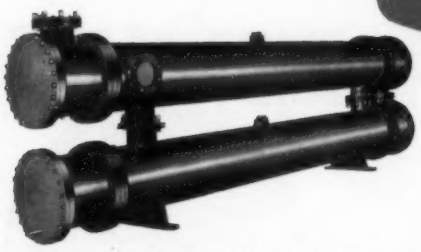
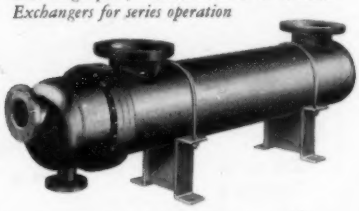


Two single pass, channel head B & G Heat Exchangers for series operation



B & G Heat Exchanger with U-bend tubing

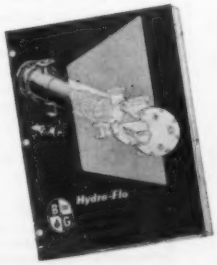
B & G shell and tube Heat Exchangers give you *more value per dollar because they are built that way!*

Basically efficient in design, these units are offered with straight and U-bend tubing. Ample material thicknesses in every detail and high tensile strength bolting are assurance of lasting strength and long operating life. Full tube bundles and close tolerances between shell wall and baffles prevent slippage of fluid and assure maximum heat transfer. Units can be furnished with tubing of copper, steel, several of the stainless steels and other non-ferrous alloys.

B & G Heat Exchangers are built to ASME Code U-69 requirements and can be certified by Hartford Steam Boiler and Inspection Service.

Whatever your heat exchange problems may be, remember that the B & G engineering staff is always available for consultation.

For additional information on B & G Heat Exchangers send for Catalog DM-1150.



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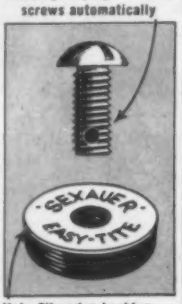
Why Faucets Leak

Faucet washers, when fastened with TOO LONG or SHORT screws — as in "9 out of 10" replacements by best mechanics — quickly work loose, destroy themselves!

"SEXAUER" finds the answer—after 34 years research

Note Nylon plug — locks screws automatically



Note Fiberglas backing — resists closing squeeze

Now, NEW Pat'd. "Sexauer" SELF-LOCK screws, with expanding NYLON PLUG imbedded in the threads, fasten and *lock* at correct depths AUTOMATICALLY, hold faucet washer *firmly*. Made of rust and corrosion resisting Monel, heads won't twist off, screw slots won't distort; they can be used over and over.

When installed with NEW Pat'd. "Sexauer" EASY-TITE faucet washers, this combination outlasts past faucet repairs "6 to 1"!

EASY-TITES are made of super-tough, pliable duPont compound (neither rubber nor fibre) to withstand super-hot water and make tight even on worn, corroded seats. They are further *reinforced* with a vulcanized layer of Fiberglas to resist distortion and splitting from shut-off squeeze.

The hidden costs of faucet leaks!

As authenticated by Hackensack, N. J. Water Co. and American Gas Association, stopping just ONE pin-hole (1/32") size leak can *reduce* water waste 8,000 gal. monthly. Stopping a *hot water* faucet "drip" can result in water and fuel saving of over $7.58 QUARTERLY—plus material and labor costs and *costly* fixture replacements!

That's why thousands of Government Agencies, Housing Projects, Hospitals, Colleges, Schools, Manufacturers, Hotels, Realties and Utilities — country wide—look to "SEXAUER" Technicians skilled in plumbing maintenance know-how. They are trained to determine stock levels thru complete SURVEYS of actual fixtures in service and to install stock systems that avoid over-stocking and shortages.

NEW SELF-LOCK SCREWS and EASY-TITE faucet washers are just part of the "SEXAUER" line of over 3000 TRIPLE-WEAR plumbing repair parts and Pat'd. precision tools.

A "SEXAUER" Technician in your vicinity will make our NEW, 126 pg. Catalog H available and gladly consult with you regarding your plumbing maintenance problems *without obligation*. Write today!

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Company or Institution.....

City..... Zone..... State.....

SEXAUER
WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

For more facts circle 645 on Reply Card

DATA FILE

(Begins on page 192)

432 Metal Conveyor Belts — This 24-pp booklet is an illustrated guide to selection of metal conveyor belts. Presents both conventional and balanced spiral weave belts; covers raised edge and flight constructions, chain edge construction, high temperature belts, wire conveyor aprons. Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp.

433 Conveyor Belting — Folder 54-3, contains a capsule description of construction, types of treated stitched canvas belting for all conveying and elevating applications. Describes company's general conveyor and elevator belt, oil- and acid-resisting belts to handle hot materials to 600 F. Imperial Belting Co.

435 Materials Handling Methods — Bulletin 552, 16-pp, illustrates 48 manhour and space-saving handling operations, and shows various material handling equipment at work in many industries. Shows how properly selected equipment gets more work done and reduces costs by making handling jobs easier. Describes general materials handling movements, motor truck loading and unloading, storing goods and materials ceiling high, handling skids and pallets with same truck. Barrett-Cravens Co.

436 Lift Truck Work Kit—A method of predetermining the time necessary for fork lift trucks to perform specific operations is provided in this work kit, designed to enable plant engineers to apply fork lift truck standard performance data. It can assist in determining efficiency of fork lift trucks now in use as well as in planning for future needs. Includes typical materials handling examples to show technique for application of the data, as well as charts providing times for basic truck motion elements. The Yale & Towne Mfg. Co.

437 For Heavy Moving—How Mighty Movers solve heavy moving problems with economy, safety and speed is detailed in this illustrated folder. Lists various applications and includes specifications. Mighty Mover Co.

438 Electric Freight Elevator—Bulletin A-414, 12 pp, contains design and operation information on company's plunger electric freight elevator designed for low-rise, light and heavy duty freight handling requirements. A sectional diagram points out component parts, and an installation diagram and size and capacity table are included. Otis Elevator Co.

439 Adjustable Ramps—Engineering details and other information on use and installation of company's hydraulic adjustable ramps for loading docks are featured in this illustrated bulletin. Two types of dock equipment are treated — the Adjust-A-Dock, installed in the loading platform or at its level, and the Adjust-A-Truck, installed at ground level to raise or lower rear wheels of truck. Rowe Methods, Inc.

440 Sheet Lifter — Operational and design features of company's sheet lifting equipment, which contribute toward efficient handling, flexibility and economy are explained in Bulletin S-25, 16 pp. Cullen-Friestedt Co.

441 Oil-Hydraulic Lifts — Catalog RE-203, 20 pp, covers the field of heavy-duty oil-hydraulic lifting devices for industrial applications. Featured in catalog are company's standard Levelator lifts, a 6000 lb single-jack model and a 12,000 lb dual-jack lift. Also featured is an electric pump mounted on an oil tank for powering oil-hydraulic devices. Illustrates lift platforms, platform accessories and safety devices, jacks, power units. Rotary Lift Co.

442 Handling Baskets—Bulletin B-54 describes company's complete line of standard and custom-engineered Eezy-Stak parts handling baskets, for machinery, washing, plating. Wire & Iron Products, Inc.

444 Self-Dumping Hoppers — Bulletin 250 describes self-dumping hoppers reported to cut cost of hand unloading at least 50 per cent. Details rugged construction of the units, safety catch incorporated, other features. Standard models are pictured, as are some typical jobs handled. Roura Iron Works.

445 Railroad Car Spotter — Book 2092 describes a car spotter with which one man can easily spot six loaded railroad cars at one time

LOAD GUARANTEE

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- Nothing to wear out—nothing to maintain.
- Moves heavy, bulky machines in hours instead of days.
- Cuts moving costs 80%.
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"Reversible," "Standard" and "Ideal" types in all sizes. Jaws are drop forged from special steel, are carefully milled, heat treated, hardened and tested. The Handles are forged spring steel. The Chains are proof-tested to ⅔ catalog strength (1,200 lb. to 40,000 lb.). "Reversible" Jaws give double jaw life. "Standard" Jaws have extra bearing on the handle and forged-in chain guides. The "Ideal" Tongs have V shaped teeth for a sure grip on irregular shapes—fittings, etc.

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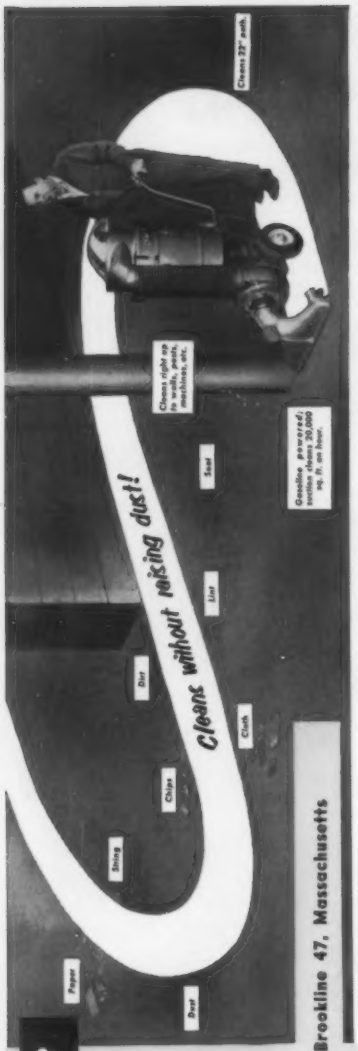

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Send for Bulletin #551 which gives complete details including a comparison with other floor cleaning methods.

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DATA FILE

(Begins on page 192)

—or handle scores of other tasks involving horizontal haulage in either direction or around corners. This spotter consists of a vertical capstan, helical and worm gear drive, housing and integral motor. Engineering information, instructions for calculating rope pulls and typical layouts for both car spotters and car pullers are provided. Link-Belt Co.

TOOLS, WELDING, AND MACHINE SHOP EQUIPMENT

447 **Portable Electric Tools**—This standard catalog, Form 10, 24 pp, features portable electric tools, including electric drills, bench-drill stands, hole saws, buffing and polishing kits, sanders, polishers, grinders, hammers, saw blades, vacuum cleaners, and others. Photos included. The Black & Decker Mfg. Co.

448 **Data for the Shop**—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. A section on metal working facts gives conversion tables, steel numbering systems, machinability ratings of metals, drill grinding charts, twist drill sizes and other data. Standard Oil Co. (Ind.)

449 **Pipe Tool Ordering Guide**—Catalog 2-51, 8 pp, covers company's line of threaders, cutters, vises, dies, tongs and wrenches; gives prices. Armstrong Bros. Tool Co.

450 **On Spot Welding**—"Spot Welding from One Side—With a Portable Gun," 12-pp, describes an inert-gas-shielded tungsten-arc spot welding process. Over 30 tables, weld cross-section and application photos, drawings and graphs are included. Sections of text cover when to consider spot welding from one side, how the equipment operates, standards and test procedures, factors affecting weld. Air Reduction Sales Co., Div., Air Reduction Co., Inc.

WATER CONDITIONING

452 **Feedwater Treatment**—Process Bulletin B1, "Treatment of Boiler Feedwater by the Direct, or Internal Method," discusses advantages of direct treatment, as a complete treating program or as a supplement to external systems. Explains why direct treatment is convenient, economical and complete, and points out how it improves steam quality and reduces boiler maintenance costs and downtime. National Aluminate Corp.

453 **For Industrial Water Softening**—Greensand, zeolite and resinous exchange water softeners are described in 8-pp Form S105. Discusses features and applications of each of these basic types and illustrates some installations. Includes capacity data and general specifications. Also describes and pictures controls for water softeners, pressure filters and deionizers. Illinois Water Treatment Co.

454 **Water Softeners**—Cutaway drawings in Bulletin MSP-123 illustrate construction of company's water softeners, and indicate simple connections by which a softener is fitted into a water system. Capacities of the various models are given, together with other specifications. Hagan Corp.

455 **Carbon Dioxide Measurement**—Technical Paper 133, 16-pp, discusses determination of CO_2 in water by conductivity measurements. Describes a new method developed for the determination of carbon dioxide which is applicable to analysis of waterside deposits, treatment chemicals and organic carbon in water. W. H. & L. D. Betz.

FILTERING

456 **Filter Fabric Facts**—This 16-pp illustrated booklet contains information about filtration principles; filtering devices; filter media; textile fabrics for filtration; a comprehensive chart on chemical and heat resistance of cotton and synthetic fabrics; sections on yarns, fabrics construction and finishing; and a round-up of filter fabrics in use. Photos illustrate variety of

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...for the Walter L. Johnson Company, Endicott, New York

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A sprayed finish is applied to each leather sheet. It's then attached to a Coburn conveyor by the sprayer operator. The system quickly carries the wet sheets high above plant equipment. There, completely out of the way, the sheets move back and forth at ceiling height. By the time they have reached the end of the conveying cycle, each sheet is ready for further processing.

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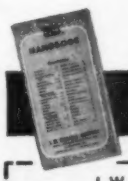

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Open Drip Proof (shown), Totally Enclosed Fan Cooled, Totally Enclosed Non-Ventilated, NEMA "C" and "D" Flange, Extended Shaft Pump Motors, Special Motors, Squirrel Cage or Slip Ring, stocked in a wide range of sizes.

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DATA FILE

(Begins on page 192)

filter fabrics being produced for industrial use. Wellington Sears Co.

457 **Filters, Strainers** — Industrial Catalog 1054, 48 pp, provides application and engineering information on company's line of microfilters and precision strainers. Fuel filters, full flow and by-pass lube filters, air separators, and metal edge strainers for fuel, lube and industrial use are presented along with construction details, performance data, and specifications. Purolator Products, Inc.

MECHANICAL POWER TRANSMISSION

458 **Roller Chains, Sprockets**—Catalog 754, 64 pp, describes, illustrates a line of roller chain stock sprockets, including minimum bore sprockets for reboring, also finished bore and Taper-lock bushed sprockets which are ready to use. Tables show speed ratios for sprocket combinations, standard keyways and setscrews. Includes chain selection and application data, installation and lubrication recommendations, chain length calculations, dimensions and price lists for single and multiple strand roller chains. Diamond Chain Co.

460 **Power Transmission Equipment**—Form 118, 24 pp, gives descriptive and technical information on variable speed pulleys, wide V-belts, sheaves, motor bases, countershafts, and Select-O-Speed transmissions. Illustrated with photos and dimensional drawings, booklet provides ratings, sizes, application and installation tips. Lovejoy Flexible Coupling Co.

462 **Flexible Couplings** — Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings for power transmission. Tells advantages of these couplings and discusses design principles. Double-flexing and floating shaft types, light duty couplings and types for special applications are described and pictured in detail. Thomas Flexible Coupling Co.

463 **Improved V-Belts**—This literature on company's Vulco rope drives explains how this rope with concave sides is designed to fill out to a precise fit in the sheave groove, to provide less wear, more pulley contact and more sure power when needed. The Gates Rubber Co.

465 **Adjustable V-Belt**—This 8-pp catalog covers company's Veelos TD and TE V-belt designed to reduce installation and operation costs on big drives. Studs, cup-washers and T-screws of the belt are illustrated, and installation and operation characteristics explained. Booklet includes directions on how to measure, to couple and uncouple, and to install. A table shows current lengths for these belts. Manheim Mfg. & Belting Co.

466 **Spacer Coupling**—Of special interest to plant engineers concerned with operation of many pumps is Manual 4838 on this company's Type F Steelflex spacer coupling which has a quick-disconnect feature. Step-by-step illustrations show how to install, remove coupling and lubricate it during assembly. Process pump selections are tabled, and dimensional data included. The Falk Corp.

467 **Fluid Drive**—Eight-pp Bulletin 9819 describes and illustrates adjustable speed Gyrol fluid drives, 1- through 25-hp, giving advantages and applications. Components and operation are covered in detail and selection tables are provided for direct connected and V-belt types. American Blower Corp.

PLASTICS, SYNTHETICS

468 **Super Polyethylene**—A new type of polyethylene which has greater heat resistance, greater structural stiffness, and better appearance than previous types, is the subject of 16-pp Bulletin C-5-216. Properties of the thermoplastic material are detailed as well as typical applications. Chemical Div., Koppers Co., Inc.

469 **Synthetic Fluids, Lubricants** — Form F-6500D, 52-pp, on synthetics, covers properties, applications, and characteristics of these poly-alkyline-glycol derivatives. Describes uses

Fire cracks flywheel... Ni-Rod "55" repairs 2,800-lb. casting

Welding saves $30,000 to $60,000 in downtime loss

Flames leaped up from the transmission belt of this cast iron flywheel. And when cold water from fire hoses cracked a flywheel section, the owner was in *hot* water!

The wheel is part of a Corliss steam engine — *only* source of power for 14 roughing and finishing stands at Wickwire rod mill, Cortland, N. Y. *The damaged casting couldn't be replaced in less than 30 to 60 days — and downtime would cost $1,000 a day.*

With easy-handling Ni-Rod "55"* electrodes, company weldors repaired the casting in less than one day. Produced strong welds that hold firmly as the 2,800-lb. segment spins through space *at more than 60 mph!*

There's no trick to welding cast iron with Ni-Rod "55". No special welding equipment. No special welding skill. Even weldors of limited experience produce sound, ductile welds without difficulty.

Want more information about cast iron welding? Write for our folder called "Repair Cast Iron Parts Quickly and Easily." Illustrated with *many* interesting case histories.

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Send for this *free* grouting guide which clearly illustrates 11 common machinery settings, methods of grouting and forming, and hot and cold weather grouting. Discussion covers proper mixing and placing of grout, reasons for using prepared, non-shrink grout, etc.

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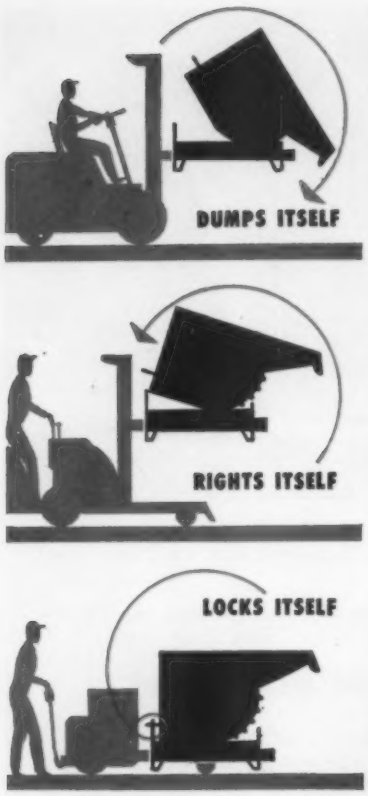

Cuts hand unloading costs 50% or more

Figure it out yourself. Compare the cost of this one-man semi-automatic operation with the time and labor involved in hand-unloading. The answer is obvious. Hundreds of leading industries have proved it . . . and are using thousands of Roura Self-Dumping Hoppers for handling wet or dry, hot or cold bulky materials.

Roura builds 'em rugged. They're made of extra heavy gauge metal with sturdy welded joints to stand up under the terrific knocks and bangs of rough handling. Fit any standard fork or platform lift truck. Also available mounted on live skids—casters with malleable or rubber tired wheels. Sizes from ¼ to 2 cubic yards.

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DATA FILE

(Begins on page 192)

as mechanical lubricants, hydraulic fluids, rubber and textile lubricants, heat-transfer fluids, anti-foam agents, solvents, and formulation components. Engineering data is presented in the form of tables and charts, and application photos included. Carbide and Carbon Chemicals Co., Div., Union Carbide and Carbon Corp.

470 **Equipment Selector Charts** — Bulletin CE-50, 20 pp, contains selector charts on corrosion-resistant equipment for process industries. Tables cover general considerations in selection of material, physical properties, corrosion resistance, techniques and skill in manufacture of equipment. Describes rubber and plastic pipe, tubing and fittings; valves; pumps; rubber-lined tanks. American Hard Rubber Co.

OTHER EQUIPMENT

471 **Finishing Systems**—Illustrated Catalog A-653, 12 pp, describes complete finishing systems for porcelain and synthetic enamel, lacquer, paint, and other finishing. Also covers a variety of other industrial equipment including ovens, dust collectors. The R. C. Mahon Co.

472 **Spray Painting** — Advantages of an electrostatic spray painting process are discussed in this 16-pp bulletin which contains diagrams of both the disk atomizer and bell-shaped atomizer. Production line examples show applications in the finishing of industrial products ranging in size from automobile chassis to door knobs. Technical laboratories where a variety of conveyors are available for testing of electrostatic spray painting are also shown. Ransburg Electro-Coating Corp.

473 **Ductile Iron**—Cast iron that can be bent is described in this 28-pp revised edition, with tables, charts and photos. Photos show applications of ductile iron castings, and bulletin lists typical applications in various industrial fields. The International Nickel Co., Inc.

474 **Neoprene Design Book**—This illustrated bulletin discusses the properties of Neoprene, showing how they are utilized in products made from this chemical rubber. Covers its toughness, hardness range, air retention, performance under load, at extreme temperatures, flame and chemical resistance. Elastomers Div., E. I. du Pont de Nemours & Co.

475 **Steel Reservoirs, Standpipes**—This 24-pp booklet pictures installation of reservoirs of 50,000- to 10,000,000-gal capacity, having cone, umbrella or ellipsoidal roofs and ornamental structures with special architectural features. Chicago Bridge & Iron Co.

476 **After Cooler**—Bulletin 130, 8 pp, explains functions of company's Aero after cooler in removing moisture from compressed air and gas. The apparatus is described and illustrated with diagrams and photos. Included also are diagrams and illustrations of applications in liquefication systems. Bulletin also illustrates other types of air engineering equipment produced by manufacturer. Niagara Blower Co.

477 **Swivel Joints** — Catalog G-4, 32 pp, covers this manufacturer's line of ball-bearing swivel joints as well as other products including loading racks, manifolding lines, all-metal hose. In addition to providing dimensional and operating data on these products, this booklet is generously illustrated. Chiksan Co.

478 **Fighting Corrosion With Corrosion**—Cathodic protection against rust and corrosion is the subject discussed in this illustrated 10-pp bulletin. Describes the corrosion battery, corrective measures, cathodic protection battery, and includes design and application data. Electro Rust-Proofing Corp.

479 **Industrial Wire Rope**—Bulletin DH-128D, 24 pp, features wire rope recommendations for industrial services. Covers more than 120 types of wire ropes used in construction, conveyors, cranes, dredges, steel mill and blast furnaces, coal bridges, guy ropes, inclines, platform lift trucks and winch lines. Each recommendation covers such points as rope diameters, construction, preforming, lay, grade and core. In addition, charts covering weights and breaking strengths are provided. American Cable Div., American Chain & Cable Co., Inc.

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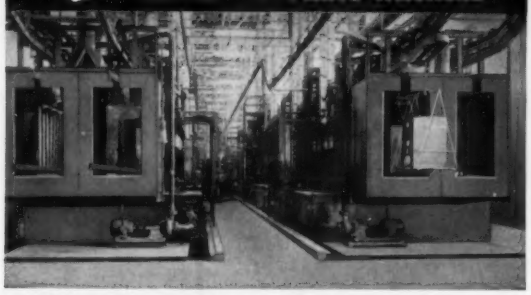
• SPRAY BOOTHS
• PARTS WASHERS

EST. 1912



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Metal parts are cleaned and processed by means of pressure sprays which converge on the parts from all angles. Solutions are heated to required temperatures by gas, oil or steam immersion heaters. Spray solutions remove foreign matter and perform metal treatment as required.

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84 Models To Meet Your Requirements

■ You're bound to lose efficiency, pay more than is necessary, when you purchase a dock levelling device that isn't specifically designed for your dock handling requirements. That's why Rowe Adjust-A-Docks are available in 84 models. There's one that will meet your specifications no matter what the problem. They can be installed recessed in your dock, partially recessed, or installed in front of the dock.

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2534-D Detroit Ave., Cleveland, Ohio

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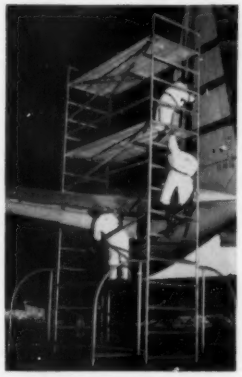
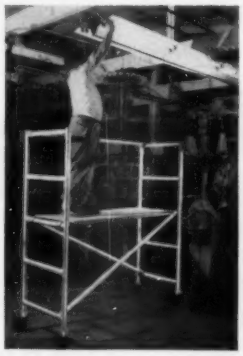
ALUMINUM SCAFFOLDS...
by The Patent Scaffolding Co.

New 4′6″-Wide Ladder Scaffold



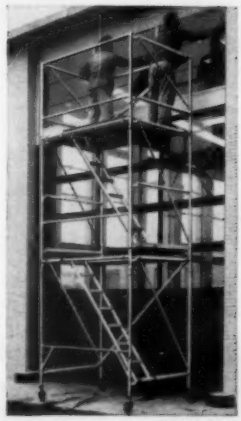
Large platform working areas are featured in this new 4′6″-wide ladder scaffold. It is especially designed for overhead repairs, painting, cleaning, relamping and other overhead work where great mobility and stability is desirable. Outriggers may be added to give additional stability when platform height exceeds 18″. Both scaffold and separate outriggers have swiveled, rubber-tired casters for easy movement to all parts of a plant. Lightweight aluminum components make the scaffold easy to erect and move. Base section is 6′7″ high with casters. Other heights possible by combining additional ladder units 5′4″ and 4′ high and by using 24″ leg adjustment. Diagonal braces give 6′, 8′ or 10′ spans. Write The Patent Scaffolding Co., Inc., 38-21 12th St., Dept. PE, Long Island City 1, N. Y.

2′-Wide Ladder Scaffold



Has same features as 4′6″-wide scaffold, but is 2′ wide. Ideal for maintenance work in narrow hallways and aisles. Rolls right through standard 30″ doorway. Can be used with diagonal braces to give spans of 6′, 8′ or 10′ platform. Compact—parts lie flat and take up little room. Write The Patent Scaffolding Co., Inc., 38-21 12th St., Dept. PE, Long Island City 1, N. Y.

Scaffold Opens Like a Book



One man can erect the base section of the "Fold-A-Way"* Scaffold in less than a minute. End frames swing open sideways, while the base section is in a standing position, making an easily managed swing of about 90°. Adding additional 6′ sections takes just a few minutes. Basic unit is 4′6″ x 6′ and is 7′ high including rubber-tired casters. Ball bearing extension legs permit height adjustment up to 24″. Approved by Underwriters' Laboratories, Inc. For more information on the "Fold-A-Way"* Scaffold write The Patent Scaffolding Co., Inc., 38-21 12th St., Dept. PE, Long Island City 1, N. Y.

* Trade Mark

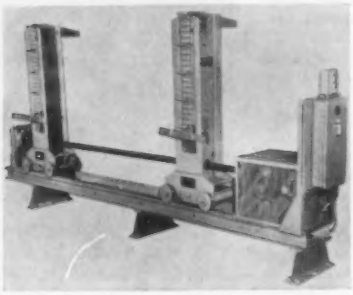
For more facts circle 664 on Reply Card

NEW PRODUCTS

(Begins on page 136)

47—BAR UNLOADER handles pieces 3- to 12-ft long

Instead of automatically feeding parts to a production machine, this unit unloads pieces of bar or tubing from a production machine to a high tote box. This bar unloader has one stationary tower



and one movable elevator, so that it can be adjusted to handle pieces from 3 ft to 12 ft in length and from 1½ to 3 in. in diameter, at a variable rate of speed. In operation, the bar or tubing flows from the production machine into a V-shaped trough which is tripped to one side as the piece leaves the machine. The piece falls down an incline until picked by the cleats of the two elevating conveyors which operate in unison. It is lifted to the top of the conveyors and over to the other side of the machine where it rolls into the tote box. Power is furnished by a ½-hp, 220/440-v three-phase motor. Feedall, Inc.

48—SPRAY treats burns with self-bandaging mist

G-63 Burn Relief Spray is a push-button spray bomb offered for treating burns and for protecting the skin with a cooling emollient film. It contains analgesic qualities to alleviate pain, says manufacturer, and hexachlorophene to preclude possible secondary infection. It is said to promote rapid resorption of abnormal fluids in the afflicted area, resulting in reduction of painful swelling. According to company, the invisible film deposited by this spray isolates the burn and keeps skin moist and soft, and eliminates need for bandages or dressings. General Scientific Equipment Co.

49—AIR HOSE is lightweight, oil resistant

Duraprene is a lightweight, two-braid hose constructed to meet company's specifications of oil resistant and applicable to many industrial uses where air pressures to 200 psi are encountered. The red hose comes in sizes up to ⅜ in. Hamilton Rubber Mfg. Corp.

50—FORK LIFT can operate in narrow aisles

Battery powered, the Type TE-4 Traveloader is announced as a heavy-duty fork lift truck which can carry and stack in aisles as narrow as 6 ft with no sacrifice of stability, speed, or ruggedness. It utilizes company's side loading-principle,

so that it does not have to turn to face its load. Thus the required aisle width is fixed by the width, not the length, of truck and load.

With a capacity of 4000 lb, the TE-4 is claimed to have speed, stability, battery capacity, ease of operation equal or superior to those of conventional electric fork trucks of the same capacity. The truck is of the stand-up rider type. Specifications include 130-in. maximum lift, 31 fpm loaded lift speed, 5 deg tilt forward and back. Baker-Raulang Co.

51—BUSHING for transformers rated above 5 kv

This high voltage bushing features a hard rubber hand-grip insulated connec-

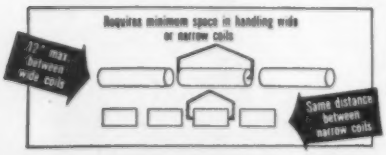
Handling Coil Stock?

CHECK THESE

C-F LIFTER ADVANTAGES

- 1 Lifter handles wide range of coil sizes
- Requires minimum of only 10" to 12" between piles —saves storage room
- 1 man operation — eliminates hookers
- Positive grip on coil — no damage to material

• C-F Coil Lifters are saving time and labor in many plants and warehouses because they can pick up, carry and set down a coil of steel faster and safer than any other method. Infinite jaw openings permit handling a very wide range of coil widths . . . carrying legs open fast, stay open until operator closes them on coil. Narrow legs require minimum space between piles — a space saving advantage. Made in motorized models for crane cab or pendant operation as well as manual types with chain wheel, in capacities from 3 tons up. Powered Rotating Heads available. Opening ranges to suit your requirements. Write for illustrated Bulletin.



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Handling Explosive METALS AND DUSTS WITH SPENCER HARTFORD VACUUM

It is not wise to leave magnesium chips around very long. That is why Spencer Vacuum is used for picking up magnesium chips as shown above and to clean all machinery frequently.

In another plant, vacuum is piped with aluminum vacuum tubing with frequent connections to the outside of the building. A Spencer 7½ HP portable vacuum producer is moved around outside the building to the various inlet valves.

The standard Spencer Stationary System can be piped to any part of the plant, with the vacuum producer and collection tanks in any safe location. Spencer portables can be provided with explosion-proof motors and control. The enclosed metal dirt containers are removed by a foot lever and rolled on casters to the disposal points. Ask for Bulletin 155. 512-E

LEADERS IN INDUSTRIAL VACUUM FOR 25 YEARS

THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

SPENCER HARTFORD

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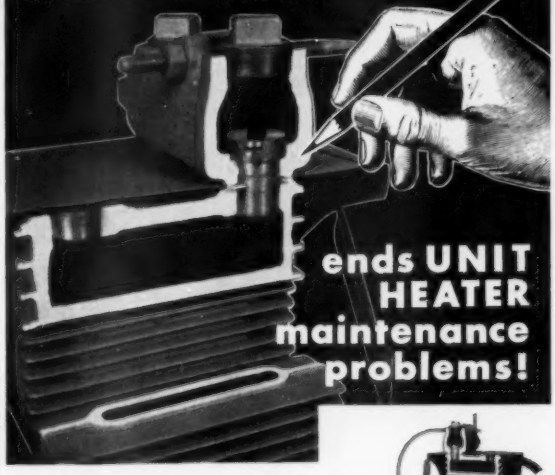
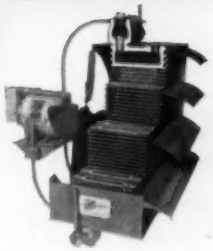
All you need to do is circle the item numbers of those you want. Then fill in your name, job title, company name and address—and mail the card.

You may also use the Reader Service Cards to request information on products described, or literature mentioned in the ads—just circle the number below the ad.

GRID CAST IRON CONSTRUCTION...



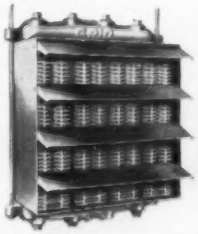


Corrosion in unit heaters—external, from contaminated air . . . internal, from electrolytic action ENDS—when your unit heaters are GRID cast iron construction, here's why—GRID heating sections are made of high-test cast iron . . . no external corrosion from acid or other fumes present in many plants.

All metals in contact with steam are similar . . . no electrolytic action internally . . . no internal corrosion.

GRID construction ends your unit heater maintenance problems—because GRID will operate on steam pressures up to 250 P.S.I. . . . 450° temperature . . . no pressure-reducing valves needed. No soldered, brazed, welded or expanded connections . . . a specially designed threaded nipple provides a leak proof joint (see illustration).

GRID design gives you maximum heating performance because—GRID provides more air changes at lower outlet temperatures . . . carefully selected motor speeds and fan capacities positively deliver warm, comfortable air in ample volume to floor level . . . no wasted heat through stratification.



GRID installations save you money as GRID requires no maintenance . . . is practically self-cleaning (not wide fin spacing in illustration). GRID provides long service life . . . units installed in 1929 are still operating. No ordinary unit heater approaches GRID's record for continuous trouble-free heating service.

Get the complete story on GRID Unit Heaters, GRID Blast Heaters and GRID Radiation for industrial plant use. Write for your copy today.

D. J. MURRAY MANUFACTURING CO.

Manufacturers Since 1883

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NEW PRODUCTS

(Begins on page 136)

tor for protection against service interruptions caused by birds and/or animals coming in contact with live parts. The hand-grip connector also permits quick, easy line installation, says company, and without tools. Connections are made by simply turning the hand grip. Kuhlman Electric Co.

52—BUSHING DROP OUT provides smooth surface

Announced as a new fitting for company's cable supporting system, this aluminum conduit bushing drop out allows cable to pass easily from cable

trough into a conduit and provides a smooth surface that protects cable insulation. Drop out can be placed anywhere in the trough system by cutting a hole in trough and attaching to trough by bolts. A clamp operated by a hollow head bolt serves to assure that the slotted collar will grip the threaded conduit securely and provide a continuous metallic connection. T. J. Cope, Inc.

53—AUTOMATIC DEVICE for tightening bolt joints

Called the PLI-Washer, this preload indicating device is designed to automatically control tightening of bolted connections and permit accurate preloading to as high as 80 per cent of bolt yield strength. The PLI-Washer consists of two concentric steel rings sandwiched between two close tolerance washers. The entire assembly becomes an integral part of a connection. The inner concentric ring is thicker than the outer ring, and is compressed as the bolt is tightened. When the inner ring is compressed to the point where the outer ring binds against the adjacent washers, the desired preload has been automatically induced in the bolt. Accuracy of preload is reported to be ± 10 per cent. Standard Pressed Steel Co.

54—GRAPHITE GUN sprays lubricant where needed

Small enough to hold in the hand, the Blaco Graphite Gun is designed to spray dry lubricant at its target while held in any position. Manufacturer says the container holds enough fine powdered graphite to permit several thousand shots of lubrication. The unit costs around 65 cents. Servwell Products Co.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 187-188.

55—CASTING METHOD uses glass powder molds

This low-cost precision metal casting technique utilizes one-piece glass powder molds. Known as the Glascast Disposable Pattern Process, it follows the lost wax investment casting technique in certain aspects, but eliminates the need for investment material and containers, and much other equipment. The lightweight Glascast molds are made by dipping a wax pattern into a Glascast slurry, coating it with coarser Glascast grains and, after drying the assembly, dipping and coating it several times, building up the mold shell. The assembly is then fired (with the wax pattern being removed at the same time) and the mold is ready for casting without further treatment.

The process was developed for casting close-tolerance precision parts of high temperature alloys. The entire process, according to company, is adaptable to assembly line practices. Pattern-to-casting time is cut sharply, it is stated, with an average of 24 hr elapsing between wax pattern makeup and casting time. Corning Glass Works.

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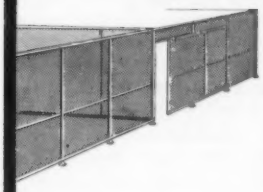

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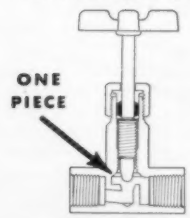

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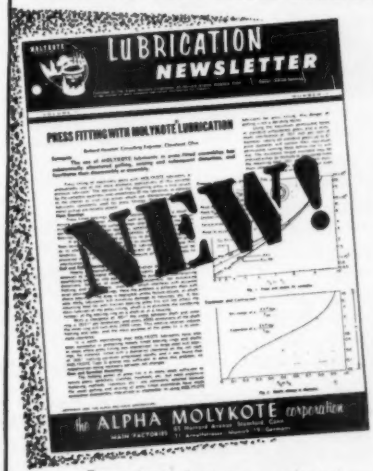

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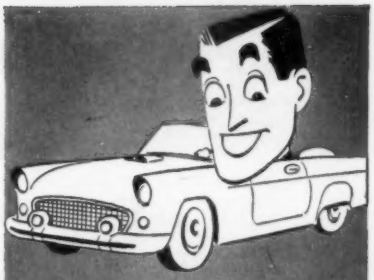

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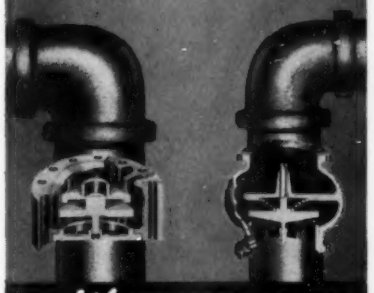

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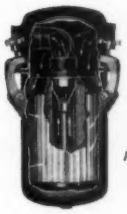

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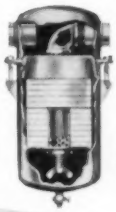

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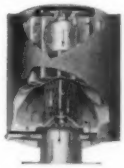

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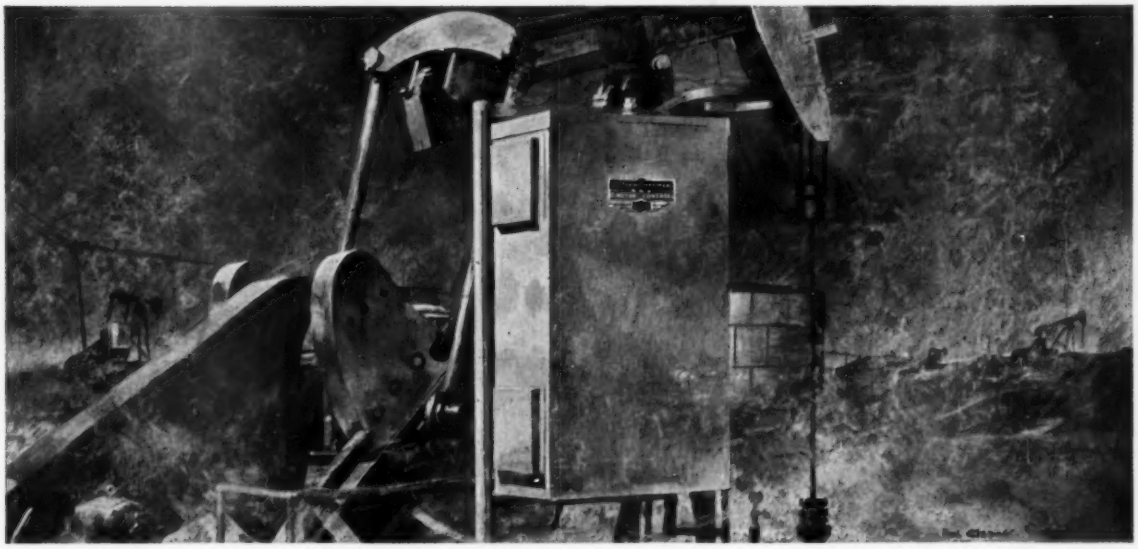
WHAT'S NEW IN MOTOR CONTROL? ★ ★ ★ GET IT FIRST IN CUTLER-HAMMER

New Cutler-Hammer Three-Star Motor Control brings full automation to oil well pumping



If automation means completely automatic operation, oil well pumping has it today. With a remarkable new Cutler-Hammer Three-Star Motor Control unit, oil wells can now be pumped on a pre-set schedule to meet any field allowable . . . completely unattended *indefinitely* as far as the programming or the electrical equipment is concerned. When a power outage occurs, any number of pumps restart in a fixed sequence to prevent overloading the power lines. The control is protected against lightning and the motors are protected against single-phasing which often results from lightning. Blistering heat, ice, bugs or dust hold no terrors for this control designed to thwart them.

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☆ *works better*

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